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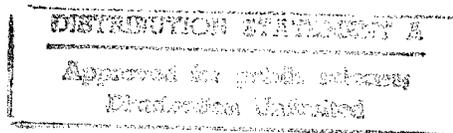
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# USSR Report

MILITARY AFFAIRS

No. 1720



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## MILITARY SCIENCE, THEORY, STRATEGY

### APPLICATION OF MILITARY SCIENCE IN WAR DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 11-13

[Article by Lt Gen M. Kiryan, D.Sc. (Military), under the heading "Military Theory": "Military Science as a Factor Contributing to Victory in War"]

[Text]

Military science is a system of knowledge of the character and laws of war, the training of the armed forces and the preparation of the country for war and the methods of warfare. It studies the laws of war, which reflect the dependence of the course and outcome of the war on politics, economics, the balance of moral-political, scientific, technological and military potentials of the belligerents, and also the cardinal processes occurring in the preparation for and conduct of war. The main object of study of military science is armed struggle in war and the armed forces. They are studied through examination of the pertinent laws and regularities.

Marxism-Leninism forms the ideological and theoretical foundation of Soviet military science. Its immediate methodological basis is the Marxist-Leninist doctrine on war and the army.

The components of military science are: the theory of military art, the theory of military development, the theory of military instruction and education, the theory of war economy and the rear; branches of social, natural and technological sciences bearing on the design, development and employment of weaponry and other military equipment, support of armed struggle, training and education of the personnel of the armed forces. Military science also deals with the theory of Civil Defence, which studies the problems and questions of this nation-wide system of measures.

Just like any other science, military science is inseparably linked with practice. This dialectical interconnection and mutual influence is manifested in the fact that practice forms the basis and

motive force of theory and also the proof of its soundness. At the same time theory serves as a guide for practice and as substantiation for practical activity. Military science formulates theoretical theses which are later verified in the course of combat reality and practical training. In its development theory has the lead over practice, it goes beyond present day practical requirements, foresees the trends in the development of certain phenomena and in this way exercises an effective influence on practical activity. The transforming, organising and mobilising role of military science consists precisely in this. And it is this role that turns military science into a highly important factor of victory. Soviet military science made an invaluable contribution to securing victory in the Great Patriotic War of 1941-1945.

The basic theoretical propositions on the character of war and methods of warfare were formulated before the war. It was precisely then that military science drew the correct conclusion about the war inevitably being protracted and imposing maximum strain on all the potentialities of the state. It also foresaw that mobile forms of warfare would prevail, though they would be combined with positional warfare too. It stated that success in the war would be secured only through the combined efforts of all the fighting services and arms. In the 1930s a theory of offensive operation in great depth and battle was developed, proceeding from the need for launching several simultaneous attacks in the entire depth of the enemy's defence positions and for destroying his main grouping through determined offensive action of infantry, massive employment of

aircraft, artillery, tanks and airborne troops. Military science correctly established the role of the rear in war and worked out a system for mobilisation and deployment.

These and all the other theoretical theses of military science were tested in the Great Patriotic War, and most of them proved sound. At the time some of them were further developed while a whole range of new problems of military science were solved. Thus, during the early period of the war, when the Soviet Armed Forces were compelled to conduct defensive action, military science developed questions of organising and carrying out strategic defence, and later methods of executing a strategic counter-offensive. The Soviet counter-offensives at Moscow, Stalingrad and Kursk were unexcelled specimens of a skilful switch-over from defensive to offensive action.

Military science also played a big role in developing methods for switching over the Soviet economy to war production. This made it possible to provide the Armed Forces with modern military equipment in increasing quantities in a very short time. This too, ultimately, was an important factor in securing victory.

The methods of preparing and conducting offensive operations by groups of fronts, fronts and armies and solving the problem of selecting methods for the conduct of a strategic offensive were a major achievement of Soviet military science. Soviet military science resolved these questions for the conduct of a strategic offensive in the face of enemy superiority with the execution of a series of operations, and in the event of a change in the balance of forces in favour of the Soviet Army with the conduct of simultaneous strategic operations on practically the whole of the Soviet-German front. The success of the military operations largely depended on the correct choice of the direction of the main effort by the Soviet forces.

Soviet military science substantiated the need for choosing the direction of the main effort with account of all the political, economic and purely military factors. Thus, during the opening period of the war the Soviet forces struck their main blows at the most dangerous enemy groupings which threatened such vital centres as Moscow, Leningrad, Kiev, Stalingrad and the Caucasus. In a later period attacks were launched in the shortest directions to Nazi Germany's vital centres.

To mislead the enemy it was found expedient to resort to various forms of manoeuvres. In some operations the Soviet forces employed slashing strikes to a great depth (400-600 kilometres) designed to break the enemy's strategic front and

form wide breaches in his defence positions. In other operations they would execute a series of splitting blows to isolate separate groupings and to destroy them in details. Soviet military science effectively solved the problems of piercing the enemy's defences and developing the success to a great depth.

Proceeding from the Leninist principle of Soviet military science that victory in war can be secured only through the combined effort of all the fighting services and arms GHQ, the Supreme Command, and the General Staff paid special attention to their balanced, harmonious development. They also took into account the fact that the main developments of the armed struggle occurred in continental theatres of operations.

Proceeding from Lenin's theses that advanced military equipment is needed to gain victory over the enemy, Soviet military science paid serious at-

tention to work on matters of providing the Armed Forces with efficient fighting equipment. Before the war the military-economic potential of Nazi Germany was superior to that of the Soviet Union. However, relying on the advantages of the Soviet socio-economic system the Communist Party managed to launch war production under the most unfavourable conditions on a scale which in many respects exceeded that of the fascist bloc countries. Gradually the Soviet Union gained military and technical superiority over Nazi Germany. This, combined with other factors, enabled the Soviet Army to alter the strategic situation in its favour as early as the end of 1942—beginning of 1943, to switch over from defensive to offensive action, to employ new methods of warfare and ultimately to secure victory over the enemy.

An important task of Soviet military science was to work out methods for creating, building up and making rational use of strategic reserves. The Supreme Command displayed special concern for the training of reserves and their effective use. This enabled the Soviet Command to repulse in time the attacks of the enemy, to build up the efforts of the forces, to effect a radical change in the situation and to complete the operation successfully.

The Great Patriotic War was a crucible in which the maturity of Soviet military and theoretical views on the conduct of armed struggle was tested. During the war Soviet military science worked out a number of pivotal problems in military theory. Thanks to their solution the Soviet Armed Forces scored brilliant victories which resulted in the complete rout of the armed forces of Nazi Germany and its allies.

After the Great Patriotic War and particularly after the introduction of nuclear weapons into the Soviet Armed Forces Soviet military science registered a sharp leap in its development. This leap was conditioned by the mounting complexity of warfare in general and armed struggle in particular. Today warfare has become so complex that problems of military development, combat training and political education, alert duty, handling of weapons and other military equipment can be solved only on the basis of science. In other words, warfare cannot be developed without persistent research and influence of science. This in turn calls for a high level of science. It is vital for science to have a considerable lead in practical warfare.

The effect of military science on the development of more advanced means of armed struggle has been particularly great. It is precisely science that develops and improves the existing types of weaponry and other military equipment. Science in general and military science in particular have

become a major factor in the maintenance of high combat readiness of the armed forces in peace time and in achievement of victory in a future war if the imperialists should unleash it.

The increasing contribution of military science to the development of warfare is particularly manifest in the current revolution in the military sphere. This revolution is reflected in fundamental qualitative changes in the means of armed struggle, the development and training of armed forces, methods of warfare and the conduct of armed struggle. The postwar period has registered a qualitatively new stage in the science-production link. Science no longer plays an auxiliary role to production. It now forms an organic element of the basis of production. It has worked fundamental changes in the material and technical basis of production and is increasingly becoming a direct productive force of society. The revolutionising effect of many sciences, including military science, is being felt in all fields of warfare. Scientific discoveries are most quickly applied in the military sphere.

The radical changes in equipment, the organisation of forces and methods of warfare have presented higher requirements to servicemen. Such qualities as proficiency in military and technical training, combat skill, excellent mastery of

weapons and other military equipment, high discipline, heroism, and self-denying effort in pursuit of military duty are now of primary importance.

The present level of military science makes it possible to foresee and forecast the development of warfare scientifically. Soviet military science maintains that it is possible to know the processes of war and armed struggle, and other phenomena too. Knowledge of the laws of war and warfare and their sound application to present-day conditions constitute the main task of Soviet military science.

Soviet military science concentrates the attention of servicemen on the need to conduct a profound study of the specifics of modern armed struggle and to develop effective forms and methods of warfare. This is necessitated by the mounting arms race initiated by the imperialist states. The Soviet Union is vigilantly watching the intrigues of the enemies of peace and is doing its utmost to defend its socialist achievements.

The propositions of Soviet military science which reflect a Marxist-Leninist appraisal of the changes that have taken place in the material basis of armed struggle, in the forms and methods of warfare and in the organisational structure of the armed forces are used above all by the Soviet Union and its Armed Forces. At the same time the achievements of Soviet military science are used by other countries of the socialist community.

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'FORESIGHT' IN COMBAT SITUATIONS DEFINED AND DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 14-15

[Article by Maj Gen L. Saltykov, Cand. Sc. (Military): "The Art of Foresight"]

[Text]

IN MARCH 1945 "Krasnaya Zvezda" (Red Star), the Soviet Army daily newspaper published "An Officer's Notes" by Colonel N. Dyomin, an infantry division commander. Among other things the author reflects on a situation he witnessed in Eastern Prussia when an infantry division had been trying in vain for two days to break through the German defences. Some of the officers proposed to stop the attacks, regroup the forces and strike a blow in another direction. The commander had no definite intelligence that the enemy on his sector was practically exhausted. However the conduct of prisoners taken, their appearance and answers to questions convinced him that one or two more blows would be enough to break the enemy's will. And indeed the first night attack broke through the enemy defence. The commander's foresight had been instrumental in scoring the victory.

What is foresight and how is it developed?

The Soviet Military Encyclopaedia defines foresight as knowledge of possible impending changes in the military situation, determination of the probable development of military theory and practice. Foresight is vital for and used at all levels of the art of war: strategic, operational and tactical.

**A commander's foresight on the battlefield implies ability to predict the enemy's probable type, means and time of action, to make a realistic appraisal of friendly and enemy combat capacity, and to estimate the final outcome of the action.**

The commander possessing this art can predict the development of the combat situation in time and with sufficient accuracy. He models develop-

ments in his mind and accordingly makes the best use of his forces. Soviet Army General P. I. Batov describes this process as follows: "The commander fights a battle twice: first in his mind, and then in reality. If the chief of staff acts more as a computer, the commander's role needs more than that. Concentrating all his intellectual powers, imagination and foresight the commander must go through this first battle in his heart and mind..."

Foresight may be classified as **scientific**, based on knowledge of the laws of war and skill to use them to one's advantage, and **empirical** or applied, resulting from one's own and other people's combat and life experience.

It is sometimes said that scientific foresight is predominantly inherent in the strategic levels of military leadership, while empirical foresight is mostly applicable to the tactical and operational levels. Indeed there are more opportunities for using scientific foresight in strategy, but no prominent wartime Soviet commander thought it quite sufficient for effective leadership. They all had immense experience of life and of war and carefully collected the experience of their subordinates down to rank and file soldiers. This combination formed a reliable basis for effective foresight.

On the other hand the tactical and operational level commanders estimating the probabilities in the course of actions always based on the understanding of the general laws of warfare and materialist dialectics.

**So foresight has always implied organic fusion of the two aspects: scientific and empirical.**

Foresight was checked in battle, and only real

combat could determine whether a decision was correct and complied with the situation at hand. The war showed that decisions were only then sound when they took a complex view of the situation in the proper perspective.

The art of prediction requires certain skills in selecting the decisive factor that is likely to influence the course of the battle in a specific situation. For instance it was generally accepted that a blow should be delivered at the weakest enemy spot. **However when surprise was expected to yield maximum results the major blow was often struck against the strongest enemy force.** An effective blow in this case often caused a complete collapse of the enemy defences.

Colonel Dyomin in his "An Officer's Notes" tells of the following case. Once his division came across two enemy strong points on the flanks, while in the centre enemy resistance was relatively slight. At first sight the course of action was obvious: to exploit in the centre. But the commander knew better, for by his knowledge of the Germans and by the trace of the defence line, which

bent inward like a horse-shoe, he suspected a trap. This soon proved to be true as the reconnaissance elements reported another enemy strong point deeper in the centre, which together with the flank strong points formed a fire-trap for the advancing troops to fall into and be destroyed by cross-fire.

So the division concentrated the effort on the right flank and in a wide left-hand manoeuvre with one rifle regiment at night-time attacked the central strong point from the rear and crushed the well-prepared enemy defence in a few hours.

**Sometimes terrain was predicted to present the best opportunities for successful actions and strikes were delivered where the enemy least expected them.** Here is how the direction of the main strike was chosen by the 65th Army in the Bobruisk operation in summer 1944. The terrain, according to our estimates, presented the best manoeuvre facilities for all the fighting arms towards Parichi. But the enemy was equally aware of this and was making preparations to meet the Soviet forces precisely along this line. P. I. Batov, the army commander, with this in view, decided to attack in different directions through marshes and swamps, difficult to negotiate, but promising surprise. The effect was rewarding: making maximum use of the engineers in preparing roads and training his troops and a demonstrative strike towards Parichi the army co-achieved complete success.

**Close observation and correct appraisal of the enemy's actions often proved of great value for**

**predicting the best moment for a blow.** During the operations near Zhitomir in 1943 General I. I. Lyudnikov, commanding the 15th Infantry Corps received knowledge of the enemy's intention to withdraw some of his units from the FEBA for a Christmas dinner. He requested permission of his direct superior General I. D. Chernyakhovsky to postpone the attack planned for the morning till dinner time. The assault elements found only stand-by machine-gun crews in the enemy's first trench and only duty squads in the second. This naturally presented no difficulty for the corps units to break the enemy resistance.

**Foresight necessarily implies prediction of enemy reactions.** German intelligence having discovered preparation of the Soviet forces for an attack began to withdraw the defending units from the forward line just before the offensive in order to save them from the artillery preparatory fire. Expecting such German moves, General V. I. Chuiikov, Commander of the 8th Guards Army would usually provide a "special attack echelon" consisting of reinforced assault battalions detailed from the first echelon divisions. Their task was to make sure that the Germans had not withdrawn from the forward position and that the artillery ammunition would not be wasted in vain. If the enemy main forces stayed in place, they would take the heavily supported "special attack echelon" for the main echelon of attack and would open its defence disposition and the system of fire. Very often this reconnaissance in force developed into a general offensive.

Foresight was also necessary in defence: A striking example is the defensive battle near Kursk in 1943. Expecting a German massive offensive on the night of July 4 the Soviet Command decided to launch a preemptive artillery counterpreparation in order to frustrate or weaken the enemy initial thrust. Foresight combined with the intelligence obtained enabled the Soviet Command to deliver devastating blows at the German units concentrated in the lines of departure.

Experience proves that a commander should have an analytical mind. But prediction is not only based on natural intuition. **It implies organic combination of natural faculties with profound and comprehensive knowledge of military science, both one's own and the enemy's, human psychology, combat materiel, etc.** M. I. Kalinin, a prominent Party and state figure pointed out: "In crucial moments of battle it is the competent and efficient people who find the necessary means against the enemy. Profound military knowledge opens wide prospects for creative activities on the battlefield. One who hopes to get along with just

innate intelligence, ingenuity and industry instead of building up professional knowledge and skills, will prove to be a failure on the battlefield."

Indeed modelling the action in one's mind requires profound knowledge of both one's troops and the enemy forces.

**War experience shows that foresight is the more effective the more it is supported by the operational and tactical calculations.** This confirms V. K. Triandafillov's (prominent Soviet military theorist) opinion that the operational art not only must but actually can be subject to mathematical processing. Moreover during the war both the methods and the accuracy of the operational calculations became more comprehensive and exact.

**War games and command and staff exercises on the eve of major operations greatly contributed to the development of commanders' foresight.** The commanders and their staffs were given an opportunity to go through their forthcoming actions against the background of the actual operational situation and try different variants of action, and to solve cooperation and tactical problems on maps and sand boxes.

The importance of commander's foresight has greatly increased in modern warfare. Therefore it is essential today to study scrupulously the experience of the operational and tactical foresight accumulated during the past war.

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## ARMED FORCES

### TYPES OF SUPPORT FOR COMBAT ACTIONS DESCRIBED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 19-21

[Article by Maj V. Osipenko, under the heading "Combat Training": "Support of Combat Actions"]

[Text]

The support of combat actions is a set of measures promoting maintenance of high combat readiness of the forces, creating for them advantageous conditions for an organised entry into battle and successful fulfilment of combat missions. It is subdivided into combat, special-technical and logistic support. This article deals with the main kinds of combat security and support (reconnaissance, electronic warfare, camouflage, security, engineer, topogeodesic and hydrometeorological support) and also special-technical and logistical support.

Reconnaissance is the most important kind of support of combat actions. Successful fulfilment of reconnaissance missions is achieved by thorough planning and coordination of all its types in time, objectives and methods of action and also by a high training standard of the personnel of reconnaissance subunits. Here one should take into consideration demands made on reconnaissance: continuity, activity, purposefulness, trustworthiness and accuracy of data (target coordinates).

Reconnaissance determines by all means available: the place, composition, strength, unit numbers, character of actions, combat efficiency and intentions of the enemy, particularly the presence of mass destruction weapons and their readiness for action; objectives and targets to be destroyed, their coordinates and also the results of the action of friendly men and equipment against them, how the areas (positions) are organised with engineer works, obstacle system, etc.

During reconnaissance of the terrain it is necessary to establish the character of the accidents

of the terrain, presence of unsurmountable and difficult natural and also artificial obstacles, condition of soil, roads, water barriers, crossings and fords on them and their approaches; the degree of influence of the terrain on the movement and combat actions. It is always necessary to specify the economic condition of the area of combat actions and the possibilities of using local resources for supplying the forces.

The commander defines: missions, what data and by what time to be obtained, where, on what objectives (areas) to concentrate the main efforts, what men and equipment to use for carrying out reconnaissance.

The staff carries out the actual organisation of the reconnaissance, plans it, brings the missions to the executors' notice, coordinates the efforts of various groups of men and equipment; organises preparation, sending of subunits to reconnaissance and continuously controls them; collects and analyses the data received, reports it to the commander and the superior headquarters and also informs the subordinate, cooperating units (subunits) and neighbours about it.

Reconnaissance data is obtained by observation, aerial and ground photography, interception and defection of electronics, combat actions of troops, actions of reconnaissance detachments, patrols, groups and also subunits carrying out search and laying ambushes, reconnaissance in force, interrogation of POWs and deserters, questioning of the local population, examination of captured documents, weapons, combat equipment, etc.

**Electronic countermeasures** include the destruction of control posts, communication centres and electronic installations of the enemy; countermeasures to his technical means of reconnaissance, electronic neutralisation and electronic protection of one's own installations.

A constant detection and destruction by fire of the enemy CPs, communication centres and electronic objectives are the main means of disorganising enemy troop control and depriving him of the possibility to use weapons. Alongside the use of fire weapons, neutralisation of electronic systems and troop control equipment is carried out.

Electronic protection is carried out to secure a stable troop control and control of equipment. It is organised and carried out for the defence of friendly electronic installations against the enemy jamming, destruction weapons and beam rider missiles.

A wealth of practical experience in electronic countermeasures has been accumulated in local wars. To detect and destroy electronic facilities the aviation and the navy of both sides used reconnaissance and jamming equipment, false target-traps, antiradar missiles. Besides, in the Arab-Israeli wars of 1967 and 1973 use was made of ground units and subunits for electronic countermeasures which seriously hampered the work of the radar posts, control posts and AD systems. Reliable defence of electronic equipment of the air defence forces of Egypt and Syria in October 1973 was achieved by using several types of control equipment over AD missiles and AD artillery operating in different frequency bands and on different frequencies. For the purpose of radio deception the work of electronic equipment was reduced to a minimum, radio silence was used, radiation rate was decreased and positions of electronic equipment and working frequencies changed.

**Camouflage** is used to conceal from enemy reconnaissance the composition and disposition of the friendly forces (forces of the fleet) and the intentions of the commander. It promotes surprise and survivability of installations.

Well organised camouflage considerably promoted a success in a number of the largest operations of the Second World War such as the rout of the Nazi forces by the Soviet Army in the battles of Moscow (1941-42), Stalingrad (1942-43), the Byelorussian, Lvov-Sandomierz and Jassy-Kishinev offensive operations of 1944, in the landing of the Anglo-American forces in Normandy in 1944 and other operations.

Success of camouflage is achieved by the correspondence of its measures to the troops' missions, knowledge of the possibilities of all enemy reconnaissance equipment, detailing the necessary men and equipment, continuity, credibility of measures taken, its organisation according to the plan of the superior headquarters.

To achieve the purposes of camouflage on any scale the following measures are carried out: secrecy by the entire personnel; concealed troop control; radio, radar, blackout, optical, sound camouflage; use of camouflaging features of the terrain, nighttime and other conditions of poor visibility; concealment of true and organisation of false areas of troop concentrations (forces of a fleet); demonstrative actions, misinformation and imitation with the use of organic and improvised means of camouflage; painting of arms and combat equipment in the colour of the terrain.

**Organisation of the terrain with engineer works** includes: engineer reconnaissance of the enemy and the terrain; fortification of departure areas, positions and lines, areas of troop positions, control points; organisation of obstacles; making gaps in enemy obstacles and demining captured terrain and objectives; organising and maintaining routes for movement and manoeuvre of troops, delivery and evacuation of supplies, building and maintenance of crossings, etc.

Most of the measures mentioned above are carried out by the troops themselves. To fulfil the most complicated missions units (subunits) of engineer and road construction troops possessing highly productive equipment and specially trained personnel are used.

**Security** is aimed at excluding a surprise enemy attack and securing advantageous conditions for entry into battle. There are the following types of security elements: a combat security, a march security guard and a security guard. Besides, units always detail their own guards. A combat security is detailed from the moment of deployment of the troops into battle formation. In close contact with the enemy the combat security missions are carried out by subunits acting on the forward edge. In defence a reinforced combat security guard is detailed having, besides the ordinary mission, that of forcing the enemy to take the line occupied by the security guard as the first position of the defence zone.

A march security guard is sent out during movement (sea passage) and, depending on the place, either to the front, flank or rear.

A security guard is detailed when holding a position (fleet anchorage at bases). The security guard is posted on hills, at road junctions, near bridges, mountain crossings and on passes. Protection of fighting ships at a naval base is ensured from the sea and the land by men and equipment of the naval base and also by the land forces in its zone of responsibility. Security forces are sent out with due regard for the mission. When defining the mission it is necessary to take into account the distance at which the forces are located from the enemy, the importance of the installation protected, the time necessary for deploying forces and conditions for observation.

**Topogeodesic support** is ensured by the military-topographic service which provides the forces and staffs with the data necessary for study of the terrain and effective use of weapons; supplies troops with topographic and special maps and also with data on changes of the terrain in the area of the forthcoming actions.

**Hydrometeorological support** collects, processes and transmits to the forces data about the immediate and long-term meteorological and hydrological situation in the combat area; prepares the data necessary for taking decisions, using weapons and exercising troop control.

Besides the kinds of support considered there are special types of combat support of Air Defence Forces and Air Force units; navigation, radio engineering, search and rescue support, etc., and in the navy antisubmarine, antimine, anti-MTB defence and others.

**Special-technical support** is responsible for maintaining reliability of weapons and combat equipment, preparing for use missiles and ammunition of all types and also providing the troops (forces of a fleet) with them, and repairing them in case of damage. It includes: missile-technical, technical (tank-technical, artillery-technical, engineer-air, engineer-technical, auto-technical, chemical-technical support, technical provision of communications, and technical supply of logistical service) and meteorological support.

**Logistical support** is intended to supply the forces with the corresponding material supplies. It includes: material, engineer-aerodrome, aerodrome-technical, transport, medical, veterinary, financial and other kinds of support.

The constant changes in means and methods of combat entail the development of some kinds of support into independent types of combat actions (AD of the forces, antitank defence, antiairborne defence, security of limiting points and flanks) and also the emergence of new types of support such as protection against mass destruction weapons, electronic warfare, missile-technical support and others.

The support of combat actions is organised on the basis of the commander's decision and the corresponding instructions of the superior commanders. The commander defines the support missions and details the men and equipment necessary with regard for the measures of the senior commander. On this basis plans are elaborated for all kinds of support. Depending on the concrete situation the plan can be worked up textually on a separate, and when time is pressing, on the working map of an official and includes support missions, men and equipment detailed, priority and means of fulfilling missions, time of readiness.

It should be emphasised that support of combat actions is carried out continuously both during preparation and in the course of battle and during redeployment and stationing of troops on their positions.

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## ARMED FORCES

### QUALITIES OF A COMMANDER DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82, pp 38-39

[Article by Col Sh Nurullin, under the heading "Psychological Training": "Will Power in the Making of a Commander"]

[Text]

In the third year of the Great Patriotic War of 1941-1945 the forces of the First Ukrainian Front were engaged in heavy fighting to extend their footholds on the right (western) bank of the Dnieper River. Captain Andrey Nazaryev's battalion was fighting in a tough sector. The success of the regiment was hinged on the accomplishment of the mission assigned to his battalion.

An enemy shell burst near Captain Nazaryev, gravely wounding him. But the battalion commander refused to leave the battlefield.

The fierce battle went on for another two hours. And during all that time the badly wounded battalion commander continued to control his subunit. He personally destroyed several dozen nazis with his submachine gun. His galant and courageous performance was a source of inspiration to his men. Finally, the battalion accomplished its mission.

During a training flight a fighter plane went out of control. Captain Yuri Kozlovsky, the pilot, had to eject. When he landed he suffered open fractures of both legs. Happening to touchdown in the hills in a severe frost, Kozlovsky decided to crawl in a direction which, he thought, would bring him to a road. He saw several helicopters flying apparently searching for him. But they did not spot him.

For nearly a day and a half Yuri fought against acute pain, fatigue, bitter cold, despair and death. And he survived.

Though these examples seem widely different, they have one thing in common: both Captain Nazaryev and Captain Kozlovsky were men of great will power. This enabled them to perform feats of valour.

Will power is the ability of a man to control his behaviour in defiance of hardships standing in the way of the goal to be achieved.

The experience of the Great Patriotic War showed that men of great will power are able to stand up to the tension of battle, to panic and critical situations. Modern combat presents even higher demands on the will power of servicemen, command personnel in particular. Only a determined commander will be able to overcome all the barriers to victory.

What qualities of will must a commander possess?

**Purposefulness** is highly important. Purposefulness is the ability to gear one's actions and behaviour to lofty aims of social importance. This quality enables an officer to have a clear view of his ultimate mission, and to appraise his actions from the standpoint of its accomplishment. For instance, in a difficult combat situation purposefulness helps the commander to concentrate his effort on the main task, to detail the necessary men and equipment for the execution of the mission in the decisive direction.

A strong-willed commander is a resolute commander. **Resolve** manifests itself in timely adoption of well-grounded decisions and immediate action in pursuit of a mission. The commander must display resolve in sharply changing situations which call for other, more effective methods of combat.

In battle it is not enough to adopt the right decision at the right time, it must also be carried out. When a combat mission is being fulfilled numerous obstacles arise, and new information flows in. Quite often success is not secured where it is expected. In battle one is always tempted to change one's decision or to amend it. The

commander must therefore display firmness, adhere to the main intention of the initial decision and not give it up without due reason. Unfounded cancellation or change of a decision will not only disorganise troop control, but will undermine the men's confidence in their commander. As a rule, the men will expeditiously carry out the orders of the commander who firmly adheres to them.

In battle it is not always possible to secure a quick victory. Quite often temporary setbacks and difficulties will arise on the road to success. To surmount these obstacles the commander must exhibit persistence. Genuine persistence is accompanied by sober-mindedness, calculation and a flexible response to changes in the situation.

A strong-willed officer invariably displays self-control and composure. Self-control is manifest in a man's ability to control his feelings and actions. During the Great Patriotic War self-control enabled commanders to overcome the most difficult situations with flying colours and to preserve the lives of their men. An officer's self-control and composure exercise a direct and powerful influence on the men. The soldiers measure the degree of danger and the complexity of the situation by the way their commander behaves during the most difficult moments of battle and by the way he issues orders. The men draw confidence in the success of the mission and energy from the commander's self-assurance and poise. If a commander shows nervousness or confusion, this may have a negative effect on the actions of the men.

An officer who knows his subordinates, his combat equipment and weaponry and the specifics of modern warfare will have self-control.

Being one-man commander of his subunit or unit, he bears full responsibility for the decisions he takes. Therefore he must display self-reliance, i.e. the ability to act on his own, in keeping with his own plan, fully confident in the soundness of his decision.

Today the role of self-reliance in battle has increased tremendously. This has been confirmed by army exercises in which subunits have been required to act on their own, in isolation from the main body. An independent commander will not lose his head if his subunit happens to be separated from the main body. He will effect confident control of his men.

One cannot count on securing victory without displaying initiative. Initiative is a quality of the commander which enables him to take a creative approach to the execution of his combat mission. Officers who constantly seek for new ways and methods of warfare should be commended. Initiative increases the striking power of a force and causes confusion in the ranks of the enemy.

During the Zapad-81 exercise a tank battalion was ordered to seize an airfield. On one stretch of the tankmen's

route it seemed as if the high rate of progress would drop because the "enemy" opened heavy fire on the right flank. The tankmen had run into an "enemy" strong point unknown to them. They could not advance unless they destroyed it. To maintain the rapid rate of advance the battalion commander ascertained that it would be possible to destroy the strong point with only a part of his force. When he saw that this could be done, he ordered Captain V. Bobrov's company to attack it. Meanwhile the main body continued to move without altering the direction of the advance. The tankmen appeared near the airfield exactly at the appointed time and executed their mission in cooperation with the other subunits.

Such qualities as daring, bravery and courage are components of will power. In battle situations frequently occur when the commander must be with the men and set them the example of gallant behaviour in combat. This paves the way for mass heroism. The commander's daring also manifests itself by initiative in battle, and also by readiness to assume full responsibility for his actions.

Daring and bravery should be combined with exact calculation and profound analysis of the situation. Recklessness will hardly help accomplish a combat mission. On the contrary, it might place the subunit in jeopardy.

Dependability is another essential quality of will power. It implies the commander's readiness, regardless of cost, danger and risk to life, regardless of the odds to carry out the order of the superior or the mission assigned to him. Dependability imparts purposeful organisation to a military collective, it facilitates troop control and ensures the accomplishment of the mission.

The qualities that make up will power are interconnected, they complement and reinforce one another.

Determined, resolute action is backed by ideological motives. Therefore, communist ideology plays a role of great importance in moulding will power in Soviet commanders. This implies lofty political consciousness. Soviet officers are required constantly to increase knowledge of Marxist-Leninist theory, to study urgent problems of Communist Party policy, the materials of its congresses and problems of the country's social, economic and political development.

The most effective way to develop will power in commanders is to participate in complex tactical lessons, exercises, manoeuvres, flights and cruises. Actions in difficult and unexpected situations instill self-control in officers, teach them to display skill in control of their actions and poise in the face of danger.

In lessons and exercises it is necessary to observe a certain sequence in building up a complex situation and introducing difficulties to be surmounted by the trainees.

If the officers are placed in conditions they cannot cope with, this might undermine their confidence in their abilities.

Development of will power in young officers also depends on individual work with them. This does not mean that different requirements are presented to their will power. The requirements are the same, but the methods used to instil them have to be different, because it is necessary to take into account the individual features of each officer.

Will power is developed through self-education too.

It follows that in a commander's professional activity will power plays a special role. Qualities of will increase the officers' activity, give him initiative and purposefulness.

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## GROUND FORCES

### GERMAN SOURCE ON TANK DEVELOPMENT, 1950-1980

Frankfurt/Main SOLDAT UND TECHNIK in German No 9, Sep 82 pp 488-497

[Text] In the following section, in which we continue the series of articles begun in volumes two and three and five through eight of this year, typical problem areas for combat tanks of the respective development phases are to be shown, and the consequences for stress on crew, components and the total system resulting during the course of the long development period as a result of the higher demands of performance will be discussed.

#### Part 3: Technical Problems in the Developmental Phase

##### Type-specific observations

In general, in the tanks of the first postwar generation an attempt was made to avoid the weaknesses of the preceding models through the use of more up-to-date components, but at the same time to retain proven components.

In the United States toward the end of World War II it was possible, because of component developments that had been introduced in the meantime, to tackle an entirely new tank generation (light, medium, heavy). Compared with the standard U.S. combat tank of World War II (M 4 Sherman), these vehicles were characterized by:

- A relatively highly developed firing guidance system with optical range finder, in part with a mechanical computer.
- Combined change-speed/reversing/steering gears with torque transducer.
- Engine and transmission as a drive block designed in a T-pattern.
- Tracks with torsion rod suspension; rubber-lined final linkage track.

Understandably, the use of, for the time in part, very up-to-date components led to certain problems in the development and use of these vehicles (M 47/M 48). In particular the optical E-meter and the linking of the sighting mechanism to the main gun initially gave reason for frequent complaints; also, the electro-hydraulic directional system proved insufficiently stable. Although in comparison with the M 4 the tracks represented a simpler and simultaneously more robust

construction, initially there were substantial problems in track guidance (M 48). The basic power transmission concept was a complete success, even though constructive changes also had to be made in specific areas (forward and reverse shifting, for example) even after delivery of the first vehicles. The type of drive mechanism selected (air-cooled V-12 engine and combined change-speed and steering gears) made possible the combination of all components into a drive block. Through this measure, for example, it was possible to reduce substitution times substantially (example: Centurion: about 20 hours, M 48: about 5 hours).

In the concept of the Centurion tank one of the most important development goals was to retain the most reliable tank possible. Therefore, to the extent possible proven components of older vehicle types were used. This is true, for example, for the Meteor engine, which represented a throttled-back version of the Spitfire airplane engine and which had already been built into the Cromwell and Comet tanks. And the Merritt-Brown steering gears come from older vehicles. Thus, the only important new components remaining are the hull, turret housing, main gun and tracks. Eventually, however, the constant increase in vehicle weight during the course of developing the Centurion tank led to problems with the service life of the engine, transmission and brakes. As could be expected, these deficiencies were especially apparent under extraordinary climatic conditions (Near East, for example). As a whole, the technically obsolete engine put heavy demands on operating, maintenance and repair personnel. In addition, the operation of the M 48 and Centurion tanks with gasoline required constant and painstaking monitoring of the fuel system, so that possible leaks could be detected in time.

In the USSR the totally new concept in the successor to the legendary T-34 was meant to show substantial improvements in its combat utility; only the main gun and the engine were taken over from earlier tanks. In this regard it is not surprising that in the T-44 it was the newly developed components (power transmission and tracks) that caused substantial problems, and series production of the T-44 had to be discontinued. Even after elimination of the technical weaknesses, high operating and maintenance costs (wear characteristics for tracks and power transmission) remained as problems for the T-54. As in the case of the Centurion as well, the mere linking together of individual components in a functional chain in the engine area (Figure 100) leads to an extremely high time requirement in replacing engine or transmission--caused by the required detachment and adjustment work (centering, alignment). The installation of the individual components on special brackets or mountings led to extraordinary sensitivity of the power transmission as opposed to hull deformations (following touchdown, for example).

Whereas some tanks of the first postwar generation had to be developed under substantial time pressure (final phase of World War II, Korean War), the tanks of the second postwar generation were able to go through a much more intensive development and testing period. Therefore, these vehicles had better prerequisites for the use of constructive measures--in addition to improved performance--to allow one to seek the following improvements:

- greater dependability;
- better material durability;
- reduction of control and operation expense.

For a number of tanks of the second postwar generation critical partial systems were again the drive mechanism with power transmission, as well as the turret directional system, especially when this system was subjected to additional stress through a weapons stabilization. The drive motor of a tank represents a typical risk component; it requires at least 10 years development time to the production stage. The constant increase in vehicle weight for the Chieftain required conversion during development to a new engine type with greater performance. The development of the new engine under time pressure meant that adequate stability could no longer be achieved prior to series production.

The provision of the AMX 30 and Chieftain tanks with a centrifugal clutch did have a certain facilitating effect on operations, but in the case of improper operation (for example, driving with low revolutions, especially on grades) it can lead to rapid wear and thus to extremely high repair costs.

Also, looking back the combination drive mechanism chosen for the Swedish tank Strv 103 does not represent a satisfactory solution, since the too weak construction of the diesel engine (176 kilowatts/240 horsepower) requires frequent engagement of the gas turbine, whereas on the other hand the gas turbine, because of the lack of a heat exchanger, is associated with high fuel consumption. In addition to that, from a logistical point of view the combination drive, comprised of two different drive mechanisms, and the corresponding peripheral systems (for example: air filter, exhaust system, etc.), also does not represent a suitable solution.

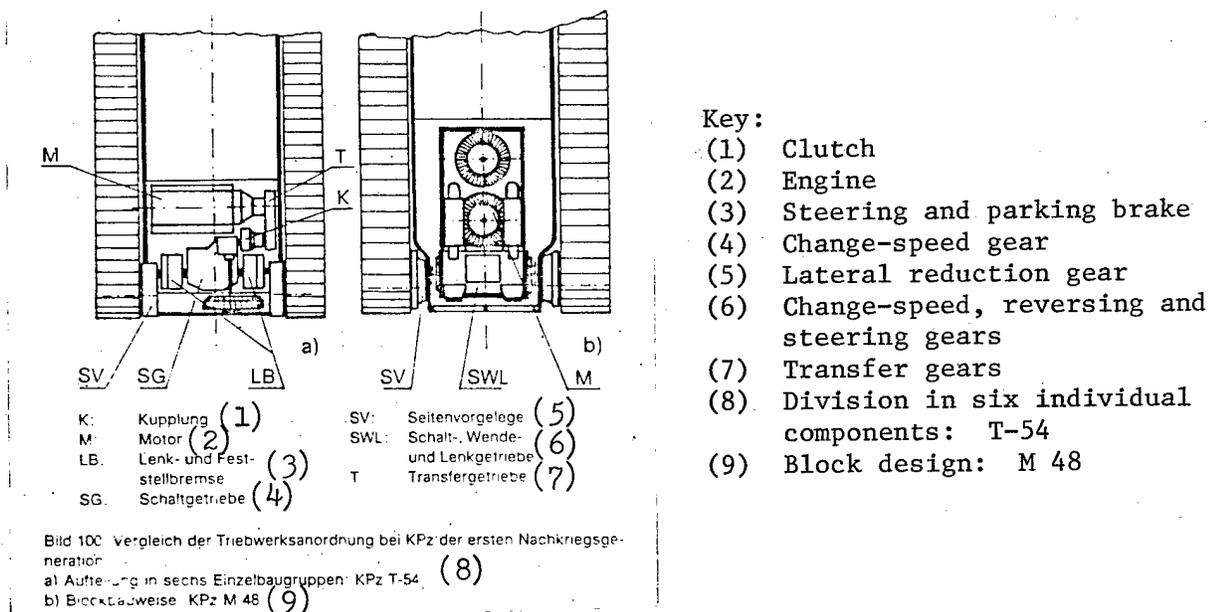


Figure 100. Comparison of the Drive Mechanism Design for Tanks of the First Postwar Generation

The Leopard 1 must be viewed as an outstanding construction among the tanks of the second postwar generation. Essentially, the success of this tank is due to a systematic development and exhaustive testing of the prototypes and vehicles of the preliminary series. The development of this tank was based on the following premises:

--To represent increased performance at a manageable technical risk.

--To achieve high availability through fully developed and reliable components, as well as through a good material maintenance record in the lower material maintenance levels.

--To reduce crew stress noticeably, and to cut operation and control costs.

The development of the engine mb 837 Ba goes back to the year 1952, when Daimler-Benz began to work on the concept of an eight-cylinder diesel engine for the Swiss tank 57. This engine later became the basis for the Leopard 1's drive mechanism. The required service life of 10,000 km is just attained under favorable conditions. The development of the transmission was more problematical, because at the end of the 1950's the FRG had little experience in the nature and distribution of stresses (total load) for tank transmissions, and on the other hand, an up-to-date transmission construction should lead to good driving performance (approach to the tractive-force hyperbola) with a simultaneous reduction in operational expenses. The initial weaknesses in the transmission (for example: disc clutches, torque converter seating, lubrication and cooling) could be eliminated through driving tests. The progress that has been achieved in the meantime in the area of steering technology led to replacement of the previously used mechanical transmission elements between the driver's place and the transmission with electric or electrohydraulic servo-systems (Figure 101). Mechanical adjusting elements were retained only for emergency operation (emergency shifting in case of power outage). It was even possible, in conjunction with loadshift planetary gears, to have fully automated transmission gear shifting in tanks of the intermediate generation (Leopard A4, for example). The rather costly transmissions in some tanks of the second postwar generation (Leopard 1, Pz 61) have proven successful under peacetime conditions; however, for the relatively rare defects high demands are placed on maintenance personnel (high material maintenance level).

The higher-than-average motorization and the high cross-country and cruising speeds thus attainable for the Leopard 1 put high demands on individual elements of the tracks. Especially bogie wheel rims, track chain and vibration damper had to be subjected to constructive changes several times during development, until a functional capability or stability acceptable for series production was attained.

Whereas for the tanks of the first and second postwar generations most of the problems were in mechanical engineering, the increased use of optronic and electronic components--beginning with the vehicles of the intermediate generation--led to a new and additional problem area. The basic differences in assembly, function, breakdown characteristics and repairability (Figure 102) between mechanical subsystems and electronic components provide some difficult tasks

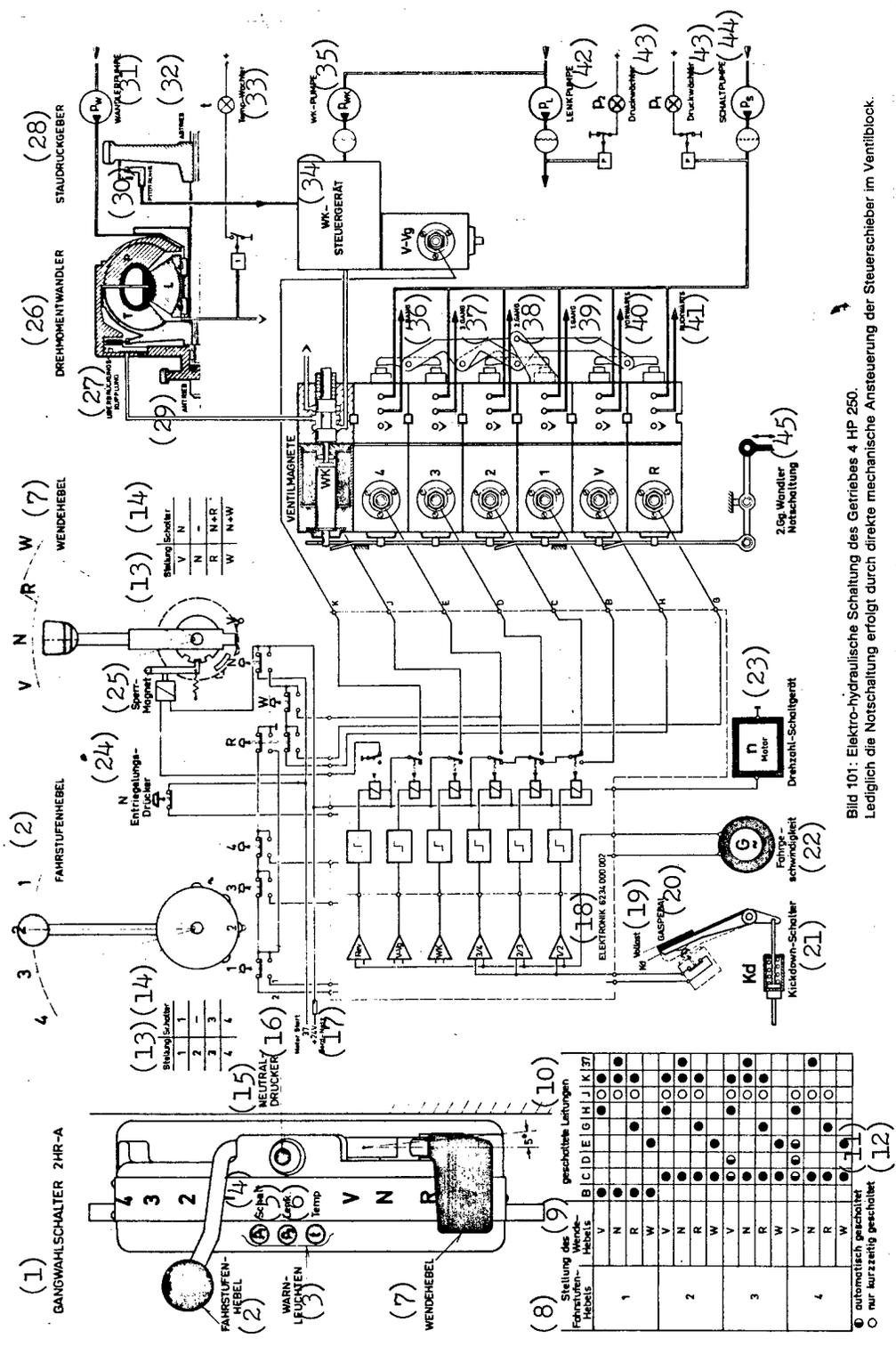
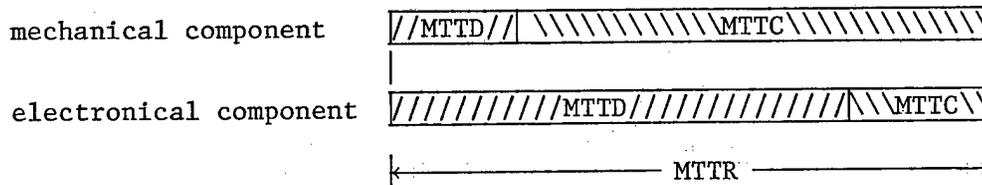


Bild 101: Elektro-hydraulische Schaltung des Getriebes 4 HP 250. Lediglich die Notschaltung erfolgt durch direkte mechanische Ansteuerung der Steuerschieber im Ventilblock.

Figure 101. Electrohydraulic gear shifting of the 4 HP 250 transmission. Only emergency shifting occurs through direct mechanical control of the plate cams in the valve block.

Key:

- |   |                                       |
|---|---------------------------------------|
| (1) Gear selection lever                | (24) Unbolting latch                  |
| (2) Driving phase lever                 | (25) Stop magnet                      |
| (3) Warning lights                      | (26) Torque transducer                |
| (4) Gearshift                           | (27) Bridge clutch                    |
| (5) Steering                            | (28) Pressure-head dispenser          |
| (6) Temperature                         | (29) Drive                            |
| (7) Reversing lever                     | (30) Pitot tube                       |
| (8) Position of the driving phase lever | (31) Converter pump                   |
| (9) Position on the reversing lever     | (32) Driven end                       |
| (10) Switched-on circuits               | (33) Automatic temperature controller |
| (11) Automatically engaged              | (34) Hydraulic steering               |
| (12) Engaged only briefly               | (35) Hydraulic pump                   |
| (13) Position                           | (36) Fourth gear                      |
| (14) Switch                             | (37) Third gear                       |
| (15) Neutral latch                      | (38) Second gear                      |
| (16) Engine start                       | (39) First gear                       |
| (17) Tank network                       | (40) Forward                          |
| (18) Electronic                         | (41) Reverse                          |
| (19) Full load                          | (42) Steering pump                    |
| (20) Gas pedal                          | (43) Automatic pressure controller    |
| (21) Kickdown switch                    | (44) Gear-shift pump                  |
| (22) Driving speed                      | (45) Second-gear transducer           |
| (23) Revolutions-switch apparatus       | Emergency shifting                    |



The sketch illustrates the shift in time spent for locating defects and changing components.

**Conclusions:**

- For mechanical components importance is attached to easy accessibility and interchangeability.
- For electronic components an automatic error search (test system) should be provided.

MTTC: Mean time to change  
 MTTD: Mean time to detect  
 MTTR: Mean time to repair

Figure 102. Comparison of Time Spent for Material Maintenance Work on Mechanical and Electronic Components

for the army's repair personnel oriented toward traditional vehicles and mechanical engineering. In the case of the tanks of the third postwar generation, in many cases the maximization of performance requirements pushed the latest technology to the limits of its capacity (for example: heat-sensing technology). The multiple mission and functional demands finally led to a considerably more complex total system.

It is interesting to note that with the development of the T-64/72 the USSR has also made a clear choice for quality or for technically sophisticated subsystems (for example: sectional view or laser range finder, automatic loading including guidance, etc.). In this regard a general convergence of Eastern and Western tank philosophies is conceivable for the future.

One consequence of the indicated problems is the discernible increase (Table 18) in required development times for contemporary tanks. The mentioned increasing complexity of the vehicles and the combination of various mechanical, hydraulic, optic, optronic and electronic subsystems thus makes absolutely necessary complete consideration of all-encompassing technical and logistical aspects as early as possible.

Table 18. Development Times for Some Tanks of the Period 1950 Through 1980

<u>Type</u>	<u>Development Time (Years)</u>
M 47	2
M 48	3
Centurion	3
Leopard 1	7
AMX 30	8
Chieftain	9
Strv 103	9
Merkava	8
Typ 74	11
M 1	8
Leopard 2	10 (14)
KPz 3/Leopard 3/KPz 90	To date 10 years (still in design phase)

#### Consequences of increased demands on performance

A review of the combat tanks developed in the last 30 years shows the following overall tendencies:

- increasing mechanical stress
- increasing vibration
- increasing heat load
- increasing noise level
- increasing interaction of subsystems
- increasing complexity of the total system.

A close examination of the enumerated problem areas leads to the following results:

#### Increasing mechanical stress

The trend discernible during the course of the development period under study to greater vehicle weights (Figure 88) and more motorization (Figure 50) has led to a considerable increase in mechanical stress, especially for the components drive mechanism with power transmission, tracks, track chain and housing, often with the following results:

- elastic and plastic deformations
- more wear
- in part long-term and impact breaks as well.

## Hull/tracks

The concentration of tank protection in the frontal and lateral areas of the combat space can lead to elastic deformations in areas with less protection during operation. Figure 103a shows the elastic deformation of the lateral hull wall in the area of the lateral reduction gear, which can be caused, for example, by the initial track tension and reaction forces from the drive moment. In addition to increased wear on drive rings and end links, it can thereby also come to a unilateral thrust of the middle guide flanges on the rear support roll. Another typical deformation is shown in Figure 103b: Because of high static and especially dynamic bogie wheel stresses in this regard, an undesired change in the bogie wheel camber occurs. In this case elastic deformations occur not only in the area of the lateral hull wall (rocker arm seating), but also on the rocker arm itself (torsion forces).

Since rocker arms and bogie wheels belong to the part of the track assembly without suspension, there is an effort to keep their own weight down as much as possible. Understandably, the need for weight limitation present for a number of other components as well also involves the danger of not being able to withstand extremely high stresses. In testing mobile tracked vehicles it can thereby often come to rocker arm breaks, for example (Figure 104).

In the case of casemate-type tanks, under unfavorable conditions chassis deformations (for example, in turning around the vertical axis) lead to a relative movement of the weapon seating and the sighting mechanisms and thus to a worsening of accuracy. The problem described can, as in the case of the fighter tank Kanone, be avoided through direct coupling of the sighting mechanisms with the main gun.

### Drive mechanism/tracks:

The indicated problems are made more difficult by the fact that a specific constructive concept for drive mechanism and tracks for a particular vehicle weight is hardly possible because of the formation of family groups now common with tanks. When as a rule the development and introduction of a tank is at the beginning of such a family, thus establishing the essential concept of the named components, experience has shown that the family vehicles that later follow are often heavier than the basic tank (Figure 105). In individual cases the development of special-purpose vehicles on the basis of the tank chassis had to be discontinued because of an unacceptable load on the tracks and/or drive mechanism.

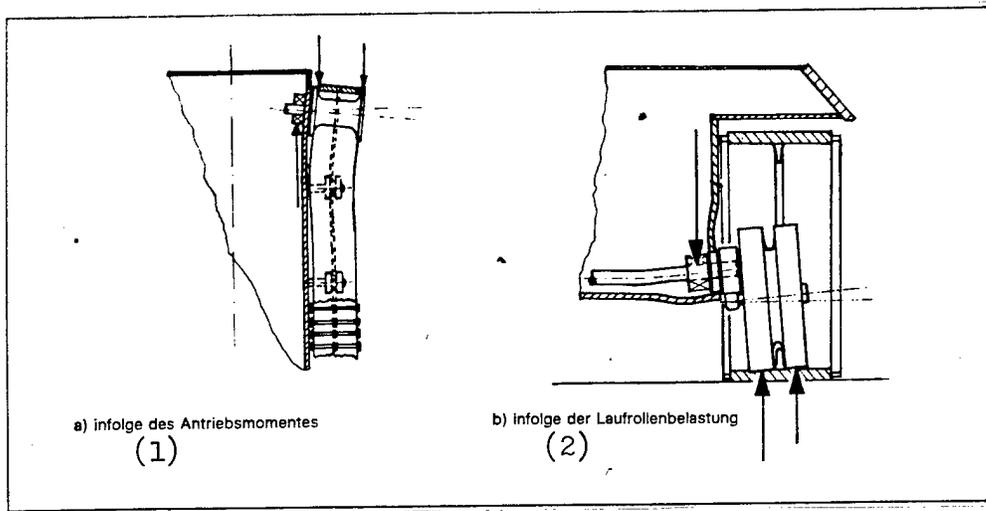


Figure 103. Typical Deformations for Tracked Armored Vehicles in the Area of the Hull/Tracks

Key: 1. a) due to drive moment

2. b) due to bogie wheel stress

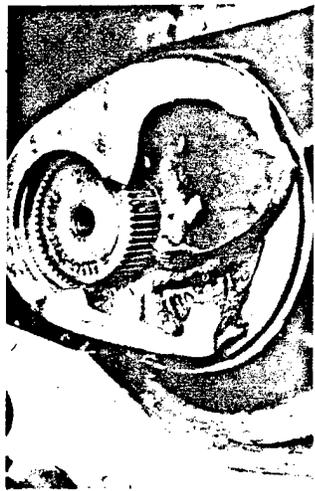


Figure 104. Breakage in a Hollow-Cast Rocker Arm in the Area of the Torsion Rod Receptacle

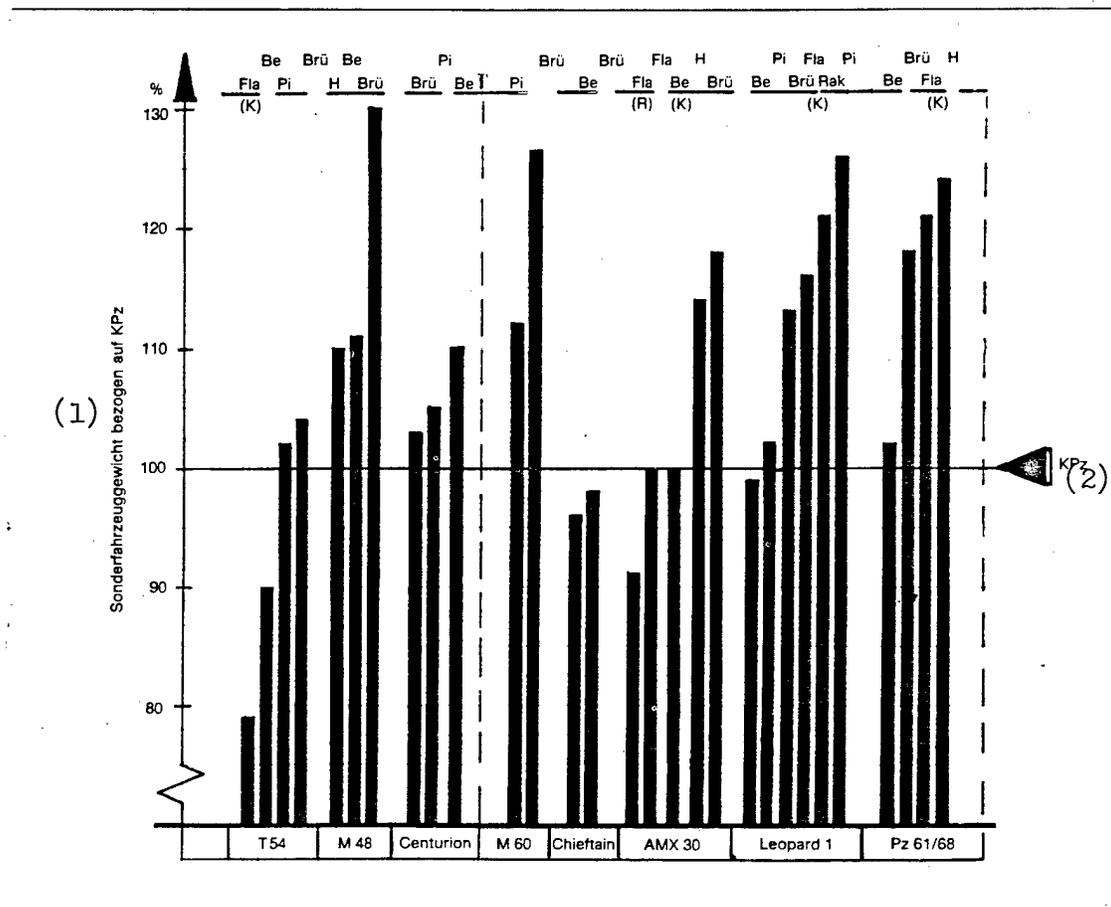


Figure 105: Comparison of the Weights of Special-Purpose Vehicles and Tanks. It is discernible that in part family vehicles on tank chassis exceed the tank combat weight by as much as 30 percent.

- Key: (1) Weight of special-purpose vehicles in relation to tanks  
 (2) Combat tank

#### Turret/turret bearings

The recognizable trend during the development period under observation to greater turret weights (Table 6) obviously has led to greater stress in the area of the hull frame as well. With turret weights of from 17 to 19 tons for contemporary tanks, especially in the case of rapid cross-country driving and in braking one must expect elastic deformations of the frame in the magnitude of several millimeters. On the other hand, elastic deformations are extremely undesirable in this area, because they lead to deviations in the turn resistance of the turret revolving bearing. By turning away from the formerly customary four-point wire ball bearings and using up-to-date three-wire roller bearings it was possible to reduce the negative effects on precision alignment or stabilizing quality for contemporary German tanks to an acceptable level.

## Increasing Vibration

Whereas earlier combat tanks generally did not reach the resonance area of their own pitch vibration in cross-country travel because the level of motorization was slight, for today's highly motorized tanks there is sufficient drive output to reach and surpass (by going into the hypercritical driving phase) the resonance phase of their own pitch vibration.

As is known, the maximum values for superstructure amplitude or hull pitch angle occur in the resonance phase. And thereby exists the increased danger that there may be hard impacts in the track area or that the leading wheel could hit the ground without suspension (Figure 106). In unfavorable cases it is thereby possible for the housing to experience brief acceleration peaks of up to 40 times gravity! The inevitable results are injuries to the crew members.

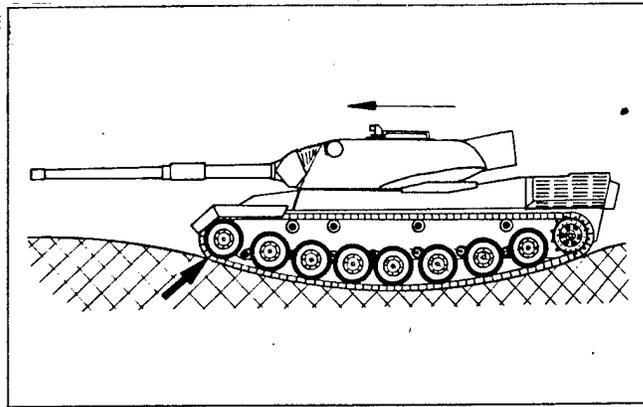


Figure 106. Touchdown of Tank's Leading Wheel During Rapid Cross-Country Travel. Impact of the unsuspended idler roller can initiate short-term acceleration of up to 40 g on the hull.

To avoid the feared leading wheel touchdown and hard impacts, the tracks of highly mobile tracked vehicles should have the following characteristics:

--Long suspension travel distance; progressive suspension characteristic; absorption proportional to speed

--Large track ascent angle

--Large track support length

--Adequate height of the leading wheel above the ground; reduced leading wheel diameter.

For future tracked vehicles with high specific drive performance, improvement in part of the indicated problems is possible through the use of an idler roller (Figure 107) with oscillating mountings.

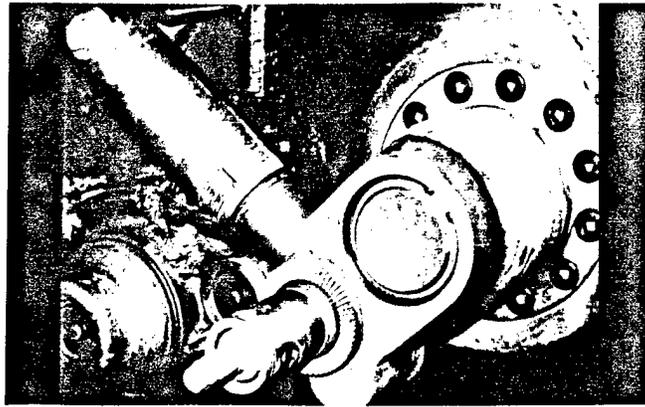


Figure 107. Showing the Function of an Idler Roller Rocker Arm With Installed Shock Absorber

In addition, through suitable coordination of suspension and shock absorbers the own frequencies of the lifting and nodding vibrations of the vehicle superstructure must be made to remain within a range tolerable to the human organism. If over a long period of time there are impulses corresponding to the own frequencies of various organs of the body, then in most cases there will be a rapid onset of fatigue and a decrease in tank crew performance; in extreme cases it can lead to life-threatening situations. Whereas for Western combat tanks through appropriate constructive measures the own nodding frequency is about 0.7 to 0.8 Hz and the lifting frequency is around 1.6 Hz, in this regard Soviet tanks appear to show less favorable characteristics. It is reported that in the 1973 Yom-Kippur War crew members were found in undestroyed Soviet tanks with injuries and spinal fractures; the cause was seen to be the insufficient suspension comfort and unsuitable interior equipping. In individual cases the vibration stress may have led to death through suffocation.

In addition to the problems described, brought about through impact stress and low-frequency vibration, in recent years additional problems have occurred in a number of tanks through higher-frequency vibration (50 to 500 Hz). The following can be named as causes for this sort of vibration stimulation:

- Larger track segmentation made necessary by track chain dimensions corresponding to the greater vehicle weight and the higher level of motorization.
- Track pad design unfavorable from the point of view of vibration stimulation.
- Use of bogie wheel banding with relatively high Shore-hardness.
- High track tension.
- Abandonment of housings out of cast steel tank armor; greater use of welded-rolled steel plate with in part rather slight wall strengths (own absorption slight).

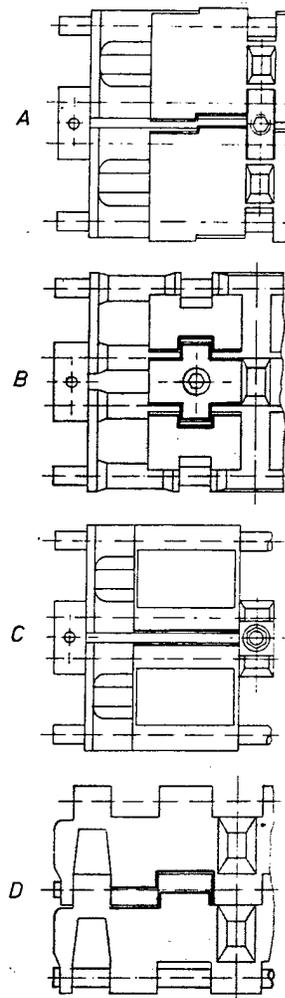
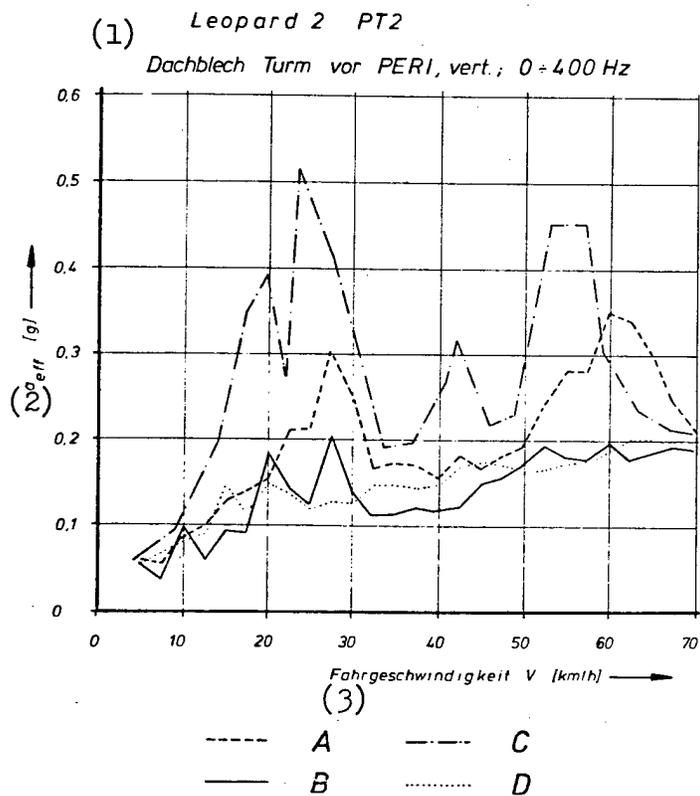


Figure 108. Effective Acceleration of the Roof Sheeting of a Tank Turret as a Function of Driving Speed Using Various Track Types (A,B,C,D). The figure shows that through design changes in the overflow gap between two track links the housing vibration can be affected.

Key:

- (1) Turret roof sheeting
- (2) Effective acceleration in gravities
- (3) speed in kilometers per hour

Thereby the most important sources of vibration are the track entry on the drive wheel (polygon effect) and the rolling of the track links over the bogie wheels.

The introduction of these high-frequency vibrations in the vehicle housing causes mainly large, thin-walled and freely vibrating sheet metal (for example: hull bottom, revolving turret platform, fire wall, turret roof, etc.) to vibrate on its own. The equipment installed on these surfaces experiences considerable vibration stress (especially in the case of resonance). Such vibrations can, for example, lead to the early failure of peripheral electronic equipment mounted on the floor of the revolving turret platform. In the use of optical sighting equipment (mounted on the turret roof) such vibrations can lead to line of sight instability, so that under some circumstances accurate firing while traveling is no longer possible. Possible corrective measures are:

- Interference with the stimulated part (detuning).
- Interference with the transfer path (for example: suspension, revolving bearing).
- Interference with the vibration sources.

Whereas in general the change in the affected housing part (through additional bracing, for example) or in the transfer path can be accomplished at relatively little cost, a specific change in the vibration sources (track chain, drive wheel, etc.) requires higher expenditures on development. Interesting in this regard is the proposal to reduce the vibrations affecting the housing as a result of the polygon effect through an elastic seating of the end drive within the hull (Figure 109). Of course in the case of a solution of this nature, among other things the torque-dependent position change for the lateral reduction gear and the resultant long-term effects on drive rings and track chain, as well as on the power transmission links, require careful study.

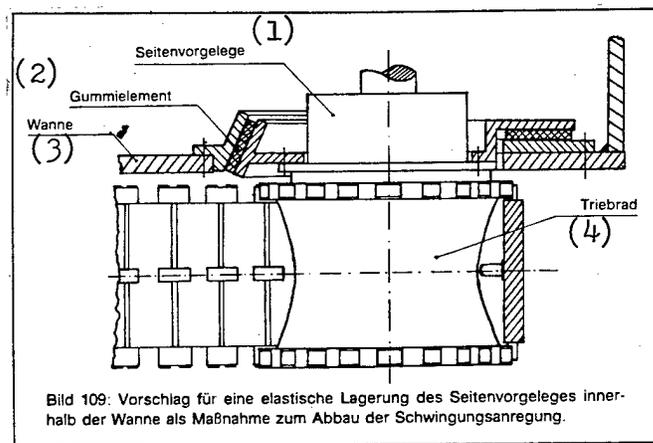


Figure 109. Proposed Elastic Mounting of the Lateral Reduction Gear Within the Hull as a Means of Reducing the Vibratory Impulse

- |      |                            |                 |
|------|----------------------------|-----------------|
| Key: | (1) Lateral reduction gear | (3) Hull        |
|      | (2) Rubber element         | (4) Drive wheel |

## Increasing Noise Stress

The metal sheets and components made to vibrate on their own during the resonance phase lead to a considerable noise level inside the combat space; noise levels of up to 125 decibels can occur, especially on concrete roadways. The result is not only problems with understanding and guidance, but in the case of longer exposure, health impairment for the tank crew as well.

Whereas for Western combat tanks the drive mechanisms are generally mounted elastically within the hull, in the case of Soviet tanks the engine is bolted directly to the hull floor. When the engine is running the vibrations are passed on to the hull floor; on the one hand this leads to considerable noise stress for the crew in the combat space, and on the other hand the driver is subjected to an additional high-frequency vibration, since the driver's seat is also bolted directly to the hull floor.

In tank construction it has so far not been possible to find any nonconducting material or insulation to solve the indicated problems.

## Increasing Thermal Load

The operation of contemporary combat tanks leads to a considerable heat production or to a high thermal load for a number of components. In cross-country travel and on grades the engine and transmission (torque transducer) produce a considerable quantity of excess heat; on longer highway travel lateral reduction gears and parts of the tracks experience a heavy thermal load. Figure 110 shows that after about 3.5 hours driving time in fourth gear an oil temperature of about 160°C is reached in the lateral reduction gear of the Leopard 2 combat tank; 180°C was reached after 50 minutes operation with other lateral reduction gears at a speed of 60 km/hour. Also, in the bogie wheel bandings temperatures of up to 200°C can occur during longer highway travel. Temperatures above 300°C lead to a separation of the banding material from the bogie wheel rim (Figure 111).

### Key:

- (1) Oil temperature
- (2) With a load
- (3) With no load
- (4) With a load (no simulated wind factor)
- (5) With no load (simulated)
- (6) Oil type
- (7) Fourth gear
- (8) Hours of operation

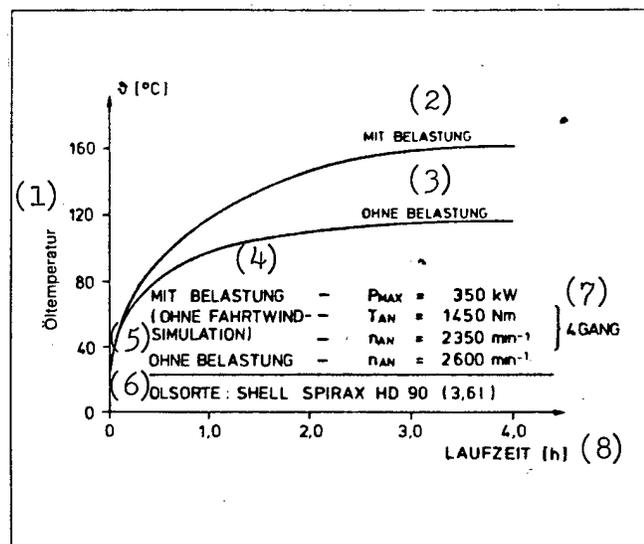


Figure 110. Course of Oil Temperature in the Lateral Reduction Gear of the Leopard 2 During Rapid Road Travel (on the test stand here).



Figure 111. Rubber Bandings of a Bogie Wheel Destroyed Through High Mechanical and Thermal Stress. The operating life was 1,880 km.

The components of the directional system, as well as electronic components, installed in the turret of contemporary tanks also produce considerable excess heat, which under some circumstances must be carried off by means of special cooling and ventilating systems.

The use of propellant charge powder with a very high heat content in today's high-power tank cannon leads to thermal stress on the barrel clearly above the level of older weapons, especially after firing several rounds within a short time.

The results of the increased thermal load are:

- Change in the mechanical or deformation properties of the materials used.
- Often the durability or stability of individual components can be achieved only through considerable developmental efforts or through additional expenditures on technology (cooling, ventilation).
- The production of large quantities of excess heat and the resulting heating up of large parts of the housing favor the locating of contemporary combat tanks through electronic reconnaissance means (heat sensing devices, for example).

In the case of the mechanical coupling of the main gun and sighting mechanisms through parallelogram rods, normal in numerous tanks of the first and second postwar generations, temperature differences (for example: heated combat space/turret roof cooled by rain or snow) can have a negative effect on the adjustment

of the sighting mechanisms. The electrical coupling synchrocircuit used in some vehicles of the intermediate generation and the third postwar generation is less sensitive in this regard.

#### Increasing Energy Requirement

In the course of the observed development time period there has been a discernible tendency to use servo-systems (electrical, electrohydraulic and electropneumatic) for those functions originally performed manually. In addition, in the course of time new or more powerful subsystems have been integrated, so that for contemporary tanks the load on the on-board electrical network is increased considerably. Table 19 illustrates this statement with a listing of the most important energy users in a combat tank of the first postwar generation and of a conceivable future tank.

Table 19. Comparison of the Electricity Users of a Combat Tank of the First Postwar Generation and of a Future Concept

User	Kilowatts used	User	Kilowatts used
Engine	1.0	Engine	1.00
Radio equipment	0.2	Radio equipment	0.50
Directional firing system	1.0	Directional firing system	2.00
Directional system	8.0	WRSA [expansion unknown]	15.00
Lights	3.0	Lights	4.00
IR equipment	1.0	Heat sensing device	0.30
Heating	0.3	Heating	0.35
	ca 15.0	Ventilating system for ABC protection	0.70
		Navigating system	0.20
		Air conditioning system	0.50
		Automatic loading	12.00
		Friend-foe identification gear	0.10
			ca. 37.00
Vehicle of first postwar generation		Future concept	

The generator output and the battery capacity also had to be increased to handle the greater energy requirement (Table 20).

Table 20. Comparison of Generator Output and Battery Capacity for Some Combat Tanks of the Period 1950 Through 1980

Type	Generator output in kilowatts	Battery capacity in ampere-hours
T 54	1.5 - 6.5	240
M 47	7.2	200
M 48	8.4 + 8.4	200
Standard tank (preliminary series)	7.0	300
Leopard 1	9.0	400
AMX 30	10.5	380
Chieftain	4.5 + 10.5	300
M 60 A1	15.6	300
M 1	15.6	300
Leopard 2	20.0	500

Based on the development described, the following problem areas are more and more evident for the energy supply of contemporary tanks:

--The high output needs for individual energy users lead in part to current strengths of up to 500 amperes; cables with large thicknesses are required to limit voltage drop.

--Such cabling is relative stiff and thus difficult to lay; in addition, it adds a lot of weight.

--In total the additional weight for the electrical equipping of contemporary tanks, taking into consideration the electromotive drives, the batteries and the cabling, amounts to 500 to 600 kg.

--The named currents cause a considerable magnetic dispersion field along the conductor, which favors the release of induction detonators of mines along the way.

Some of the indicated problems could be solved in future combat vehicles by increasing the on-board network voltage from 24 volts at present to 144 volts, for example.

In the case of contemporary combat tanks, the increased energy consumption makes the installation of an auxiliary motor with a separate generator appear reasonable; in this way in alarm or watch positions, as well as after moving into the disposition area, the energy source and the battery charge could be assured without running the motor. Although initially the use of an auxiliary motor seems quite attractive, it also requires considerable additional costs (space requirement, its own weight, coupling with the overall system in regard to fuel supply, cooling, electrical system, as well as service, maintenance and

repair). Especially costly is a liquid-cooled auxiliary motor, and it was for this reason that after exhaustive technical testing of the Leopard 1 and 2 with auxiliary motors the additional aggregate was finally abandoned in the production version. Less costly is the use of an air-cooled auxiliary motor, such as the one used in the M 48 A2 (180kg, 8.4kw), for example. Although today's advanced technology in small gas turbines would allow the use of an additional generator system at minimal cost, according to recent reports the decision to install a Gemini small gas turbine (40 kg, 10 kw) in the U.S. M 1 combat tank has been reexamined (Figure 112).

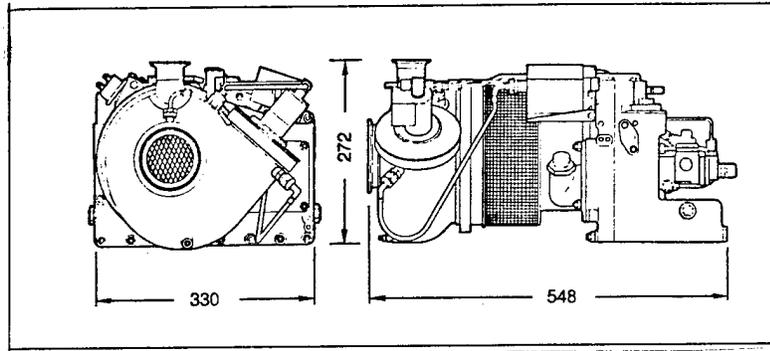


Figure 112. Dimensions of an Additional Generator Unit With a Gemini Small Gas Turbine as Drive Source (in millimeters)

#### Increasing Subsystem Interaction

In the course of the observed development period higher output and energy emissions on the one hand and greater sensitivity on the other hand have caused a number of components that work exceptionally well under laboratory conditions either to show considerable functional impairment or to interfere with other subsystems after inclusion in the total system. The multiple interactions (desired and undesired) of a component with the total system--and vice versa--are represented schematically in Figure 113. The aspect of system compatibility has therefore become increasingly important in recent years. As a rule, the later system compatibility and interfacing problems are noticed and dealt with, the more costly are the measures necessary for adapting and coordinating the various subsystems.

Typical functional problems of system compatibility have already been discussed in this series of articles.

--For example, the introduction of a new track type led to considerable turret roof vibration and thus to an unstable line of sight when sighting mechanisms were used while traveling.

--Or the additional strengthening of tank protection led to reduced service life for turret directional drives or for elements of the power transmission and tracks, for example.

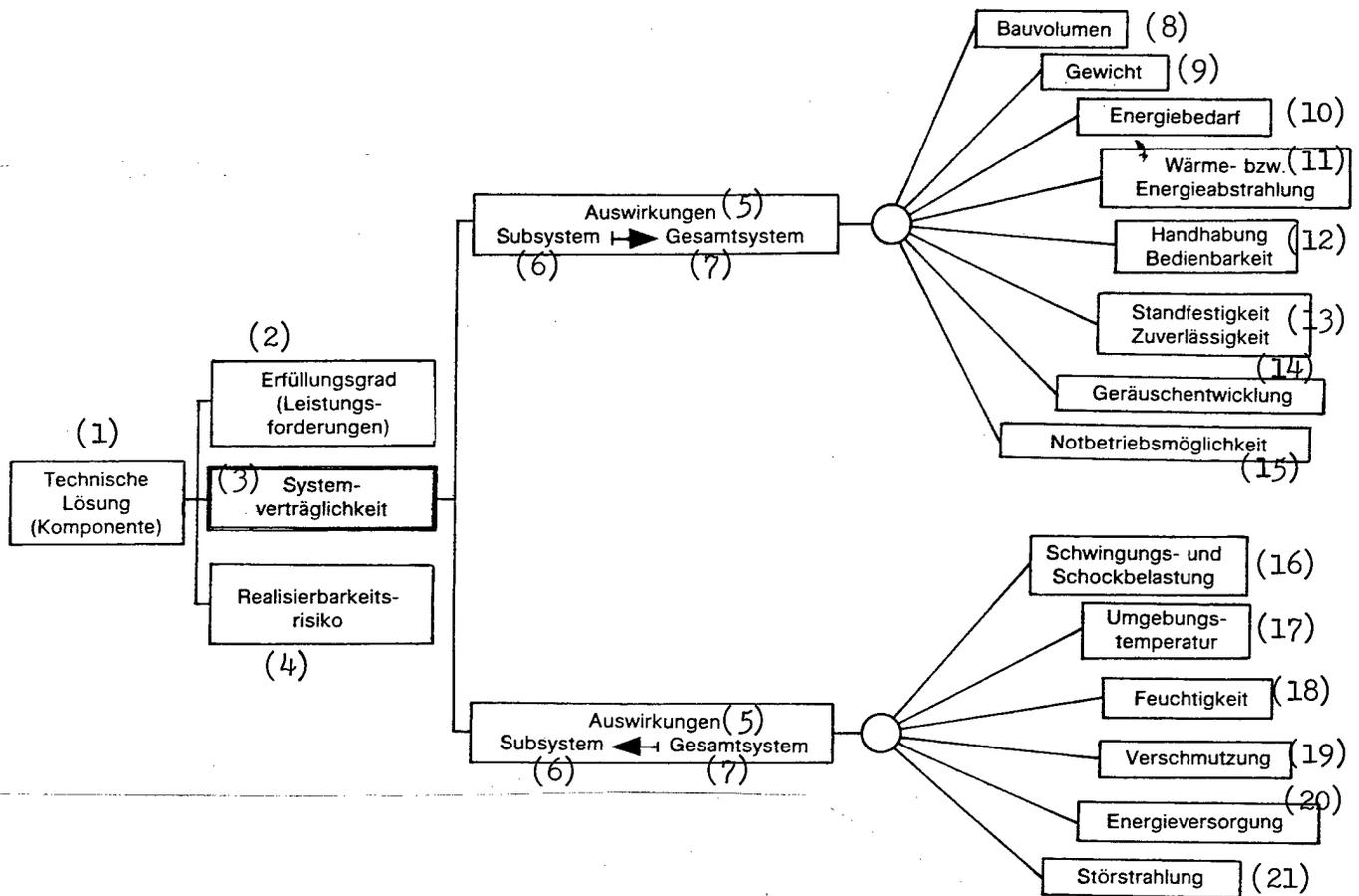


Figure 113. Judgment Parameters for the Suitability of a Component in a Tank Under Special Consideration of System Compatibility

Key:

- |  |  |
|--|--|
| (1) Technical solution (component)             | (12) Handling Operability                |
| (2) Degree of completion (performance demands) | (13) Stability Reliability               |
| (3) System compatibility                       | (14) Noise generation                    |
| (4) Realization risk                           | (15) Possibility for emergency operation |
| (5) Effects                                    | (16) Vibration and shock stress          |
| (6) Subsystem                                  | (17) Ambient temperature                 |
| (7) Total system                               | (18) Humidity                            |
| (8) Structural volume                          | (19) Dirtiness                           |
| (9) Weight                                     | (20) Energy supply                       |
| (10) Energy requirement                        | (21) Radio interference                  |
| (11) Heat or energy emission                   |  |

The so-called electromagnetic compatibility is an important partial aspect of total system compatibility; the possibilities for mutual electromagnetic interferences are represented in Figure 114. Because of the high integration density of components with high energy emission (radio apparatus, for example) and elements reacting to a slight change in the effective signal (electronics of the weapons follow-up guidance system, for example), in contemporary combat tanks this partial area in particular requires early and careful investigation so as to employ effective measures (for example: shielding, filter, grounding and cable guidance) to assure an orderly working together of a tank's numerous "sources of interference" and "hollows."

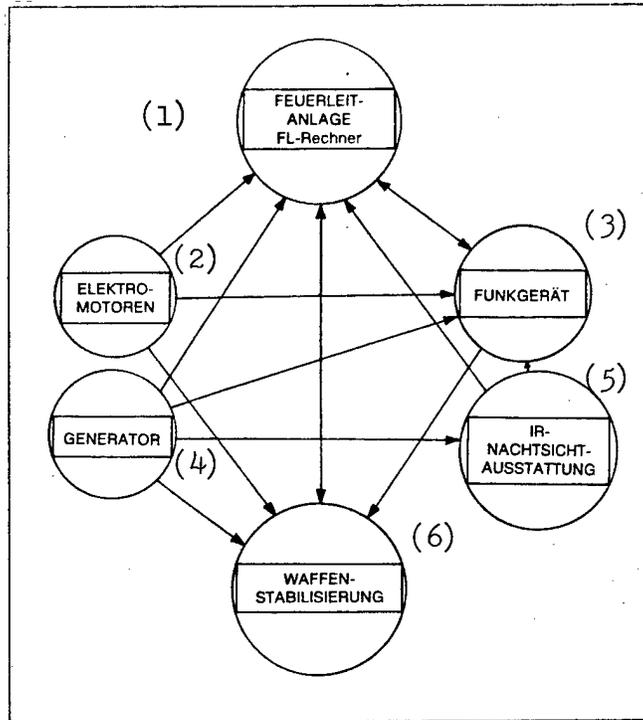


Figure 114. Representation of the Mutual Electromagnetic Influences of Some Tank Components.

Key:

- |   |   |
|---|---|
| (1) Directional firing system with computer | (4) Generator                               |
| (2) Electromotors                           | (5) Infrared equipment for night visibility |
| (3) Radio equipment                         | (6) Weapons stabilization                   |

Increasing Complexity of the Total System

The realization of constantly greater demands on performance and more extensive mission requirements in the combat tanks of the last 30 years while simultaneously adhering to the basic concept (turreted tank) could only be achieved through increased performance of subsystems or through the installation of additional

components. In only a few instances could the combat value be enhanced through:

--Use of improved materials and application of more favorable production procedures.

--A simpler construction concept.

--Use of reliable and at the same time efficient components.

The described increase in performance was chiefly attained through:

--Use of complex subsystems with in part quite sensitive components.

--Greater load--principally from mechanical and hydromechanical components.

The following problem areas, especially in contemporary combat tanks, were the inevitable results of the indicated development:

--Increase in the financial costs for development and procurement, but especially for the operational phase.

--Increase in training costs for operating and repair personnel.

--Decreasing total system reliability and thus less availability (Figure 115).

--Higher material maintenance costs (requirements for spare parts, storage and transport space, demands on infrastructural facilities).

--Limitation of the number produced because of the high unit or system price (at a given financial level).

Especially the aspects

--limited production series

--limited total system reliability

indicate the danger that with this development philosophy there are clear limits to the original intention, namely that of achieving the greatest possible fighting strength. On the other hand, under consideration of realistic development times and costs it is not possible to attain a perfect (100 percent) reliability of the total system over a longer time period (see Figure 116); instead, for today's combat tanks one must necessarily accept a certain unreliability or nonavailability.

Since in the final analysis the availability of up-to-date weapons systems is determined by their level of reliability and their material maintenance characteristics (Figure 117), in the framework of development there is a need to find a time and cost-optimum compromise between the requirements to achieve a certain reliability and the costs of material maintenance. Today these so-called reliability and material maintainability analyses represent an important element in the developmental activities for contemporary combat tanks.

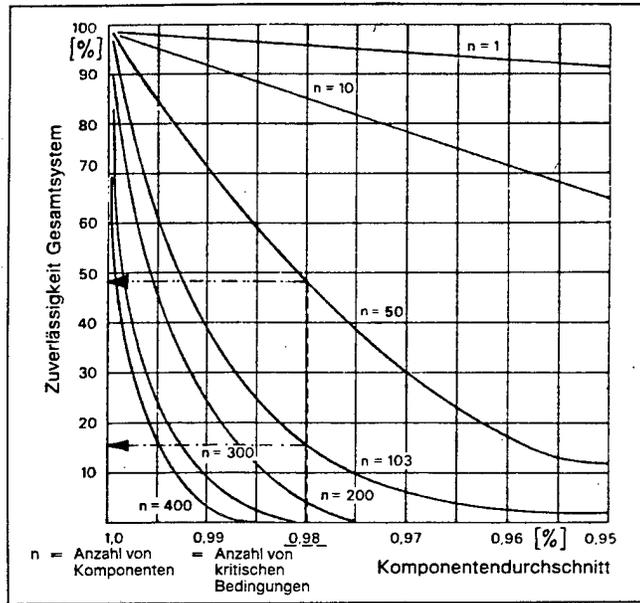


Figure 115. Relationship Between Total System Reliability and the Number and Average Reliability of the Individual Components: With a supposed 98-percent reliability of the individual components, a system composed of 50 components will attain a total reliability of 48 percent, but one composed of 103 components will attain only 15 percent.

Key: (1) Total system reliability (3) Number of critical conditions  
 (2) n=number of components (4) Component average

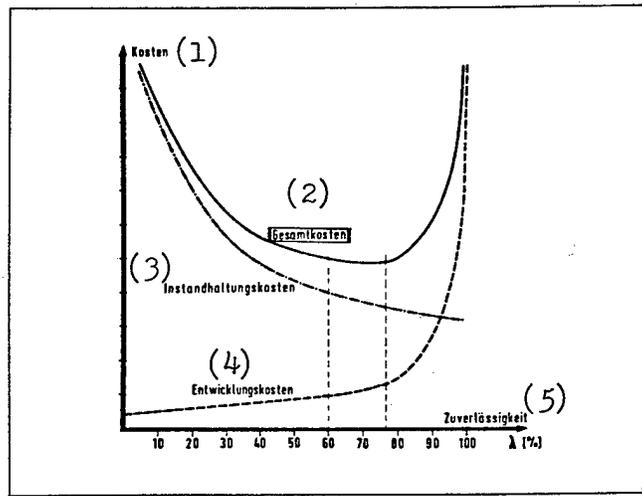


Figure 116. Qualitative Relationship Between Development and Material Maintenance Costs and Reliability. The figure illustrates the fact that there is a minimum total cost for a particular level of reliability.

Key: (1) Costs (3) Maintenance costs (5) Reliability  
 (2) Total costs (4) Development costs

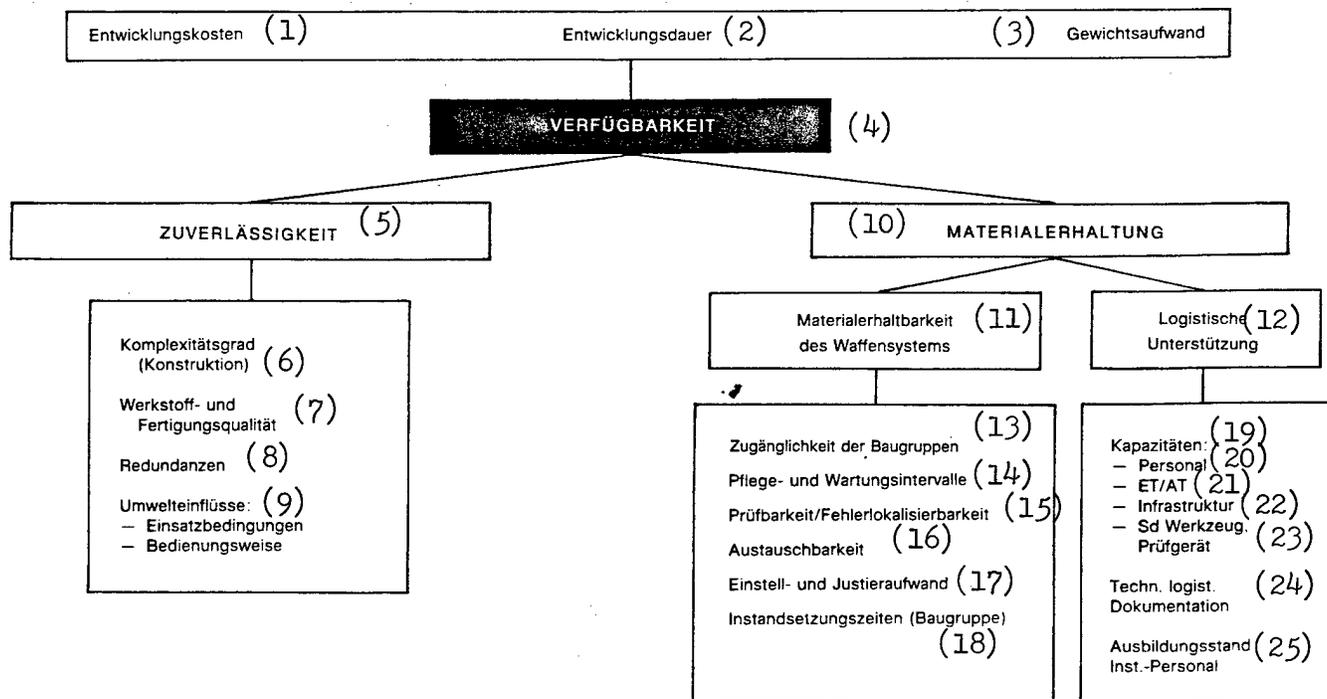


Figure 117. Factors Influencing the "Availability" Parameter of a Weapons System.

Key:

- |   |   |
|---|---|
| (1) Development costs                               | (13) Component accessibility                            |
| (2) Time to develop                                 | (14) Maintenance and servicing intervals                |
| (3) Weight outlay                                   | (15) Faculty for testing/error locating                 |
| (4) Availability                                    | (16) Interchangeability                                 |
| (5) Reliability                                     | (17) Setting and adjusting costs                        |
| (6) Degree of complexity (construction)             | (18) Repair times (component)                           |
| (7) Material and production quality                 | (19) Capacities   |
| (8) Redundancies                                    | (20) Personnel  |
| (9) Environmental influences                        | (21) ET/AT  |
| --Mission conditions                                | (22) Infrastructure                                     |
| --Method of operation                               | (23) Standard tools, testing equipment                  |
| (10) Material maintenance                           | (24) Technical logistical documentation                 |
| (11) Material maintainability of the weapons system | (25) Training level of maintenance and repair personnel |
| (12) Logistical support                             |   |

In particular the examples M 1 and Leopard 2 show that only through the use of up-to-date resources and procedures in the framework of material maintenance can the required availability of the total system be attained; included in this regard are:

--Use of internal and external testing systems for operational control, functional testing and locating defects.

--Facilitation of component exchange (good accessibility, elimination or reduction of work for setting, balancing and adjusting).

--Improvement in the logistical organization for the procurement of spare parts using electronic data processing.

--More effective training of operational and repair personnel using training equipment, simulators and video systems.

--Application of procedures for recognizing weaknesses within the total system.

A final view in regard to the chapter "Technical Problems of the Individual Development Phases" leads to the conclusion that:

--The combat tanks of the first postwar generation were composed of relatively simple components with adequate reliability. However, the availability was limited by a high time requirement for material maintenance, since operation of these vehicles was associated with heavy wear for individual components in the area of power transmission and tracks (does not apply to U.S. combat tanks).

--The tanks of the second postwar generation already contained more costly components, whose complexity, however, mainly served to reduce operational wear. Therefore, the tanks of this epoch seem to represent a certain optimum in regard to reliability and material maintenance costs. An outstanding example may be the Leopard 1, whose system follow-up costs amount to about 5.5 percent of original procurement costs (per year, for 1,500 km); of that, about 4 percent is for spare parts costs. In relation to the operational phase, this tank represents one of the most reliable and economical vehicles. As a rule, the technical performance capacity offered by the combat tanks of this generation can also be handled in the framework of the tactical mission by a crew made up of conscripts.

--The tanks of the third postwar generation with their numerous and complex subsystems put considerably higher demands on material maintenance, so as to maintain adequate availability under the given reliability. Because of the high performance demands, these vehicles experience distinct problems in regard to the weight and energy balance. It hardly seems possible that conscripts can fully master the performance and functional features of such complex universal weapons systems within the period of their military service.

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## GROUND FORCES

### SMALL SUBUNIT TACTICAL OPERATIONS DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 29-31

[Article by Maj V. Popov: "Platoon Attack at Night"]

[Text] There are quite a few examples of tactics in which active, daring and resolute night actions of small subunits raised panic and confusion in the enemy ranks and paralysed his will to resist. This is natural. Night actions are successful in the majority of cases because they are nearly always unexpected. Therefore it is very difficult for the enemy to define the real strength of the attackers and the direction of the main blow. This article deals with the main stages of a tactical exercise during which a Mts Inf Pl launched a night attack.

During on-the-spot reconnaissance on Hill 122.5 (see Sketch) Platoon Commander Lieutenant V. Vakhrushev discovered that the "enemy," holding defences on the northern bank of the Melky stream, had stopped the advance of the attacking subunits. In front of the FEBA there were mine fields. The company was assigned the mission to destroy the "enemy" men and fire weapons on Hill 120.4 in a night attack, to capture its northern slopes and then to advance in the direction of inhabited locality Izotovo. The 2nd Mts Inf Pl under Lieutenant Vakhrushev was to destroy the "enemy" on the eastern slopes of Hill 120.4, to capture the line: ruins-stones and then to advance in the direction of Hill 119.5.

The platoon commander knew that the route of advance to the assault position and the lane would be designated by red luminous markers. At the beginning of the offensive the artillery would fire an illuminating shell in the depth of the "enemy" defences. The attack was

planned to be carried out on foot.

Having ascertained the mission Lieutenant Vakhrushev estimated the situation. Analysing the obtained information he came to the conclusion that before the frontage of his attacking platoon was a position of an "enemy" section. The most dangerous fire weapons were a recoilless gun and a machine gun. The accidents of the terrain in the direction of the attack were complicated. A stream and depressions which demanded a certain time to cross presented natural obstacles which helped the "enemy" to hold the occupied line firmly. At the same time the "enemy" defence had its weak points. The depressions before the FEBA and in the depth offered facilities for manoeuvring or bypassing the strong point unobserved.

Taking into consideration the peculiarities of action in a limited visibility, the platoon commander envisaged how to mark the direction,

the method of terrain illumination and negotiation of obstacles by sections and APCs. Having taken his decision he reported it to the company commander and then issued an order to the subordinates. First of all he indicated the reference points, gave information on the character of "enemy" actions, the combat missions of the platoon, neighbours and supporting artillery and then assigned missions to the sections.

He ordered the 1st Section to destroy a recoilless gun, the 2nd Section the infantry in a trench and the 3rd Section a machine gun. Lieutenant Vakhrushev ordered machine gunners on APCs to move forward after their sections and, firing from short halts, to destroy the enemy men and weapons. The motorised infantry was to negotiate the gap in the mine field planned to be made during the fire attack in the following order: the 2nd Section, the 1st and the 3rd Section. To maintain the right direction of the attack the

2nd Section was detailed as a guiding section. Besides, all section commanders were shown the places for installing an illuminated reference point and also the azimuth of movement during the attack.

Terrain illumination was organised by men and with the equipment of the senior commander. However, for additional illumination of the necessary objectives during the offensive, the platoon leader detailed an illuminating post consisting of two men. For mutual identification the personnel were ordered to paint two white stripes on their helmets.

Particular attention was paid to knowledge of signals. In night fighting this is of paramount importance. For calling fire and target designa-

tion it was planned to use tracer bullets and red flares. To designate one's position a green flare was to be used. Having made certain that the section leaders knew the assigned missions, Lieutenant Vakhrushev ordered them to bring them to the knowledge of the motorised infantrymen.

### ATTACKING THE FORWARD EDGE

At the set time the 2nd Mts Inf Pl as a part of the company passed the initial point. On the line: Vyso-kaya Wood-Hill 110.8 the personnel dismounted and began to move

under cover of artillery fire in pre-battle formation (section lines) towards the "enemy" FEBA. At that time the artillery fired an illuminating shell in the area of inhabited locality Izotovo. Having reached the line of attack, the platoon deployed into a skirmish line and following the attached tank launched

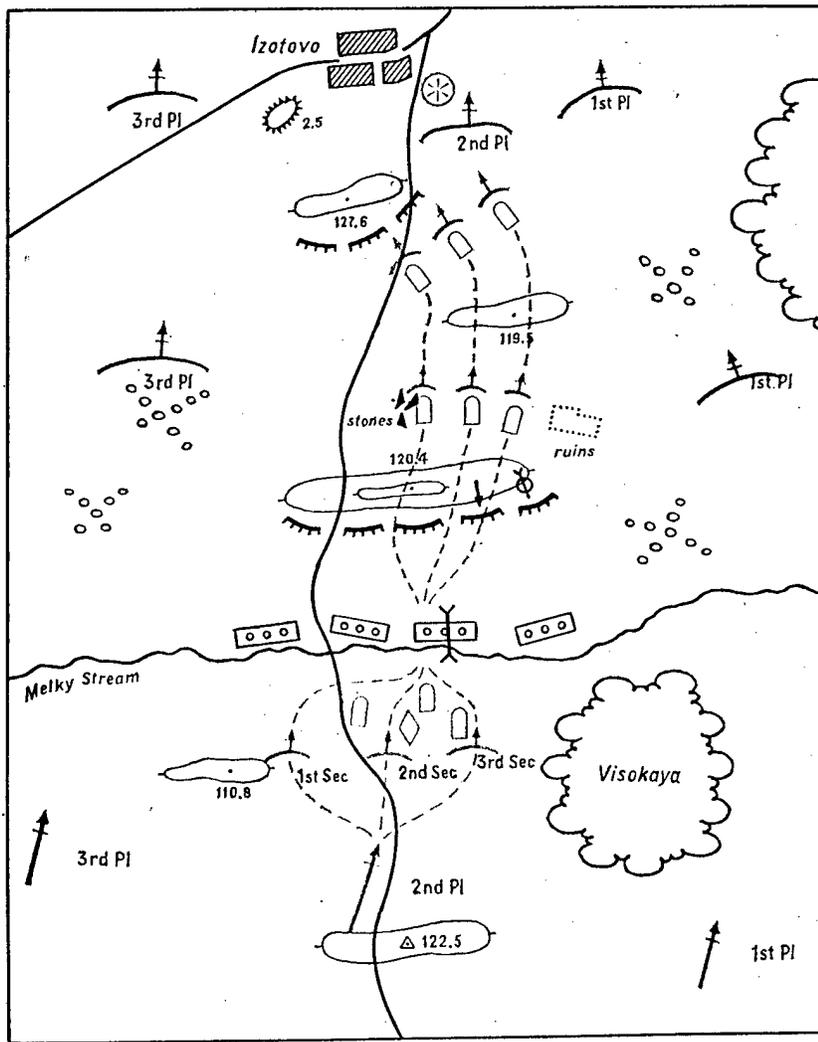
the attack. APCs took up advantageous positions and opened fire at targets detected in the first trench. The fire reached its highest intensity at the moment of negotiating the mine fields.

Negotiating mine fields is a very important moment of battle. At that

time the "enemy" concentrated the fire of all weapons available on the passages in order to inflict maximum losses on the attackers and to break up the assault. Therefore, success of the offensive depends to a considerable extent on the commander's skill in organising negotiation of the passages so that there will be no delay or weakening of fire at the "enemy."

Lieutenant Vakhrushev's platoon acted efficiently. While overcoming an obstacle the fire on the "enemy" was continuous. The leading section was the first after the tank to rush into the gap. Its movement was supported by fire of the 1st and 3rd sections. Having overcome a mine field, the 2nd Section deployed into a skirmish line and by fire at all targets on the "enemy" FEBA created favourable conditions for the other motorised infantry.

Hurling hand grenades at the "enemy" the men rushed into the first trench. During the attack the forward edge was illuminated by equipment of the senior commander and where necessary, at a command from Lieutenant Vakhrushev an illumination post came into operation. While the infantry sections were destroying the "enemy" on the forward edge, the APCs negotiated obstacles along the passage and



took up fire positions in the combat formations of their subunits. Periodically switching on night vision devices, machine gunners carried out reconnaissance, detected targets and then destroyed them.

Of particular importance were the actions of the APCs. If in an offensive by day they move behind the infantry, as a rule, at a distance of up to 500 m, in a night battle this distance is considerably reduced. At this exercise the APCs first followed their sections and then moved directly in their battle formations. In their turn, having observed the results of fire by machine guns installed on the APCs, the infantry felt themselves more confident. And this factor is of important significance

in a night battle. Besides, the section leader had at hand an effective means of destroying "enemy" targets.

### IN THE DEPTH OF DEFENCES

Having defeated the "enemy" on the forward edge, the platoon rushed deep into the "enemy" defences. At first the offensive developed successfully. But when the subunit approached Hill 127.6 it came under heavy "fire." The speed slowed down. Having estimated the situation Lieutenant Vakhrushev decided to pin down the "enemy" on the front with part of the forces (this mission was assigned to the 1st Section), while other forces were to bypass him along the gorge and on a signal to attack the flank. His concept came to the following: by a surprise night attack from an unexpected direction to create the most favourable conditions for the decisive defeat of the "enemy."

The personnel of the 1st Section and the machine gunners of the APCs opened fire at targets on Hill 127.6. Taking advantage of this

the 2nd and 3rd sections began to make a turning movement, headed by the platoon leader.

Despite the complicated situation, the infantry men skillfully carried out the planned manoeuvre. In night fighting even the slightest deviation from the set direction can lead to loss of orientation. However that did not happen because Lieutenant Vakhrushev controlled his subunits competently. Skirting the hill, the 2nd and the 3rd sections reached the indicated line. The platoon leader gave the signal to pass over to the offensive on the front and the flank — two red flares. As a result

of the concerted and skilled actions of the infantry men the "enemy" resistance on Hill 127.6 was broken.

The platoon continued to advance while the "enemy" withdrew in small groups in a northerly direction. Striving to exploit the success achieved Lieutenant Vakhrushev decided to start in pursuit. He strove not to lose contact with the "enemy" to prevent him from making an organised withdrawal. At the same time he warned the section leaders that the "enemy" in his turn would lay ambushes, organise various barriers and install obstacles. Therefore in the course of the pursuit it was necessary to be vigilant and constantly ready to repulse surprise counterattacks.

In accordance with the decision taken the 3rd Section moved in front. It was carrying out reconnaissance. The direction was observed by compass. On separate sectors ground features were used for orientation. Thus, for some time, the platoon moved along the road running in the northern direction. Then, when it began to turn off to the East, the motorised infantry men maintained the set course by the azimuth. During pursuit the platoon repulsed two "enemy" counterat-

tacks and as part of the company reached the line: Izotovo-Barrow +2.5.

At the critique the exercise director commended the competent actions full of initiative by Lieutenant Vakhrushev who in a very brief time had organised a night battle, fought it resolutely and courageously, skilfully controlled his subordinates' actions and made use of every possibility to place his platoon for a flank attack on the "enemy."

## GROUND FORCES

### MOTORIZED RIFLE UNITS: PSYCHOLOGICAL TRAINING DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 36-37

[Article by Col. N. Sysoyev: "Psychological Training of Motorised Infantrymen"]

[Text]

After capturing a strong point a motorised infantry platoon started to pursue the retreating "enemy." Suddenly one of the infantry fighting vehicles caught fire. The men quickly abandoned it. The battle dress of one of the infantrymen was burning. He dropped flat on the ground and rolled over several times to stamp out the flames. Having done so he joined the others who were extinguishing the fire. The flames were licking the armour, surrounding the men like a wall. But the men displayed perfect poise, without even a hint of panic. Making use of improvised means they finally put the fire out and, taking their seats in the infantry fighting vehicle, proceeded to fulfil their mission.

This was only an episode in the daily drills of motorised infantrymen. Tactical exercises and specialised drills filled with elements of controllable hazards and risk enable the motorised infantrymen to develop the necessary moral and combat qualities. The commanders create situations which help the men overcome hesitancy and fear and develop emotional stability, will power and the ability to carry out their duties in the most difficult circumstances.

Such qualities as communist convictions, patriotism, proletarian internationalism and fidelity to combat traditions play a big role in the psychological training of Soviet servicemen. Confidence in the righteousness of the cause one is working or fighting for and lofty political consciousness form the ideological basis for staunchness, courage and combat activity of servicemen.

An essential element in the psychological training of motorised infantrymen is training them to surmount fear of tanks. For this purpose special drills are conducted. One of these consists in the men crawling under tanks without the engine working and then with the engine working, climbing on top of the tanks, jumping off them in motion, hurling

grenades at stationary and moving tanks from different angles. When these skills have been consolidated more complicated drills are carried out. The men are taught to hit tanks from trenches on approach. If a man fails to damage the tank, he allows it to pass overhead and then hurls hand grenades at its rear. The men are also taught to fight tanks on open ground. In learning to engage tanks in the open, i.e. without cover, they first acquire camouflage skill to mislead tank crews as regards their intentions. Thus, pretending to be dead a soldier will cautiously watch an AFV and, if the opportunity presents itself, he will crawl between the tracks. As soon as the tank passes over him, he will throw a grenade at it.

In tank and armoured vehicle fighting drills special care is taken to ensure safety. And the men are well aware of this. Nevertheless, these drills are a severe test, because they subject the men to severe psychological stress which often prevents them from carrying out the exercise from the start. In such situations the example set by experienced men produces a tremendous impression on them. Thus, during a tank fighting drill many men of a unit felt uncertain at first. The commander gave them an opportunity to watch the performance of experienced tank fighters. When the younger men saw that there was nothing to fear, they behaved differently. They calmly took up their positions in the trenches the tanks were to pass over and waited for them to appear. Hardly had the tanks crawled over the trenches, when the men rose from the bottom and hurled grenades at them.

Units have special training grounds known as fire zones, equipped with firing and communication trenches, barriers, fences, mockups of semi-destroyed buildings. The men train here in various forms of combat, negotiating blazing obstacles at high speed and firing on the move. Battle noises are simulated with the help of blasts, smoke pots and tape recordings. As the men negotiate the obstacle course

they hear the whine of flying shells and mortar bombs and the roar of tank engines.

A motorised infantry unit of the Order of the Red Banner Cis-Carpathian Military District has equipped a splendid fire zone. It has two brick walls with a narrow passage between them, a communication trench, a tunnel of barbed wire arches, the frame of a permanent weapon emplacement with an armoured turret, and a set of other obstacles. At each obstacle there is a wheel barrow with an incendiary mixture. An electric ignition circuit can set fire to the mixture either in all the containers simultaneously or separately one by one, in the entire complex or at separate obstacles.

In the beginning the men learn to negotiate each obstacle separately. At this stage the incendiary mixture is not ignited. The trainees are required to run along the narrow passage between the two brick walls and through the tunnel, jump over the ditch or run over a log, get into the half-destroyed emplacement, climb into the armoured turret, jump down onto the ground and prepare to open fire. As soon as the men acquire the necessary degree of proficiency in that, they are required to carry out more difficult drills. At the next stage the incendiary mixture is ignited. The younger men find it difficult to surmount the sense of fear in the beginning, to force themselves to step into a wall of flame. And not merely to step into it, but also to continue carrying out the mission. In addition, the men have to learn to run quickly, to jump over obstacles, and to crawl under burning girders. To carry out these drills a man must develop daring, will power and resolve. He must also be agile, strong and capable of great endurance. These qualities are acquired through constant drills and training. As a rule, after adequate practice a man will act with daring and resolve.

At a drill in the fire zone an officer asked the motorised infantrymen how they felt when negotiating flaming obstacles. Private V. Nazarchenko said:

"I shall not pretend that I did not feel afraid in the beginning. Fire is fire. But when I saw the commanders and more experienced comrades storming the fire zone without any hesitation, I tried to keep up with them and to do my best. For instance, I needed only a few drills to learn not only to suppress the sense of fear, but also to extinguish the centres of fire, to help my comrades fight the fire and put out the flames on their battle dress."

Of course, not all the men can learn to do these things immediately from the start. Some of the younger ones find it difficult to jump over a ditch filled with a burning incendiary mixture. In this case they are required to carry out a few extra preliminary drills. They are taught to jump over a narrower, say one metre wide, ditch before they are required to negotiate wider ones.

By artificially creating a shortage of time and information at exercises, by introducing higher speeds and by raising the standard of requirements as to "cleanness" of execution of operations the commander builds up stresses which affect the men's psyche. This enables him to check not only the combat proficiency, but also the level of psychological steeling of the men. Taking into account the men's performance at the exercises, he will organise further combat training and psychological steeling. The training facilities are also constantly improved. For instance, one of the units of the Order of the Red Banner Byelorussian Military District built a special sports centre designed for simultaneous development of physical qualities and will power. The apparatus, such as horizontal and parallel bars appear conventional at first sight. But they are fitted with telescopic supports which make it possible to raise them higher than normal. For instance, executing a rise with turnover at the regular height is one thing but at a four-metre level it is entirely different. The soldier must display daring and self-control in doing such an exercise.

Many motorised infantry units practise mass competitions, in which the participants have to climb rocks with the help of a rope, negotiate deep chasms, run over a log spanning a ravine, etc. Regular repetition of such exercises and drills removes fear from the men's minds when they have to do something they have never done before.

Some subunits have introduced a tactical version of morning exercises. When reveille is sounded the motorised infantrymen proceed in full marching order at a rapid pace or run to the nearby hills. Assuming attack formation they storm one of the heights. They negotiate crevices, fallen trees and road blocks. The routes of these tactical morning exercises are regularly changed to create additional difficulties. Practice has shown that such drills not only help combat training, improve the physical endurance of the motorised infantrymen, but also develop their daring and resolve. As a rule, they have to storm the hill in the hazy light of early dawn, in poor visibility, when every stone, ravine or fallen tree becomes a serious obstacle.

Firing a submachine gun, hurling a live grenade, crawling over the ground and negotiating the fire zone help develop will power and raise the level of psychological stability of the motorised infantryman. Combat training in all its forms increases his psychological stability.

**Colonel N. SYSOYEV**

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## NAVAL FORCES

### VICE ADM V. KUDRYAVTSEV ON COMMANDER TRAINING

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 22-23

[Article by Vice Adm V. Kudryavtsev, Commander of a Baltic Fleet Naval Base: "Commander's Skill"]

[Text]

A COMMANDER'S SKILL IS BASED ON HIS ABILITY TO USE THE MOST EFFECTIVE FORMS AND METHODS OF COMBAT TRAINING AND TO APPRECIATE IN TIME ADVANCED EXPERIENCE CONTRIBUTING TO INTENSIFY THE TRAINING PROCESS. DURING BATTLE THE COMMANDER MUST SKILFULLY CONTROL HIS SUBORDINATES AND INSPIRE THEM TO FIGHT SELFLESSLY. VICE-ADMIRAL V. KUDRYAVTSEV, COMMANDER OF A BALTIC FLEET NAVAL BASE, TELLS OUR READERS ABOUT THE NEW DEMANDS ON COMMANDERS IN MODERN CONDITIONS AND ABOUT THEIR METHODS OF WORK.

**A** COMMANDER MUST be an organiser and a creative thinker. He must be prompt in tactical thought, able to make a profound analysis of the situation and to foresee the course of events. To foretell the outcome of a battle, he must also foresee the enemy's actions. Although highly important at all times, the commander's role has today a new and extremely important content. Military units and formations are provided with complicated weaponry and equipment, the naval forces have radically new warships which the crews must learn to handle in a critically short time. Tactics has also changed radically, requiring new practical skills. To ensure high combat readiness of the forces, the commander must use the most effective training methods and proceed from advanced combat experience.

Today the navy has well-educated officer cadres. But in addition to their sound knowledge of officers must have perfect skills for training naval specialists. The ship's commander plays the role of tutor and senior comrade-in-arms to every sailor. A draftee's professional qualities and the level of his education are determined largely by

the way he is received on the ship and familiarised with his duties.

I'll never forget one of my first commanders, O. Grumkov, a veteran of the Great Patriotic War. He was strict and exacting to his subordinates and irreconcilable even to their slightest shortcomings. I remember my excitement when I first met him. However, despite my expectations, I was given a warm and unpretentious reception. The ship's commander firmly shook hands with me, offered me a seat, sat down nearby and began to talk to me in a fatherly way. He mentioned my service record and praised me for my successes. I was with him until late. Our heart-to-heart talk really put me at my ease. The commander described the ship's crew with whom I was to share my service life and advised me how to plan my service hours and free time.

This meeting increased my self-confidence, I was inspired by the fact that I had a kind and clever superior, a ship's commander ready to help me in any situation by word and deed.

Soviet naval commanders use every opportunity for conducting individual work with their subordinates. In this they proceed from pedagogical and psychological laws as we see from quite

a few examples. One of these shows how Lieutenant-Commander Kovtun, a patrol boat commander, approved a plan drawn up by the political classes instructor. He first looks through the plan and has a talk with the instructor to make sure that he is qualified to organise the forthcoming lesson properly and to provide it with the appropriate training aids and equipment. Then the commander specifies training methods, in what order the training questions should be dealt with and gives advice on how to work up practical skills with the use of weapons and equipment and to incorporate competitive elements in the training process. All this being settled, the commander approves the plan.

By his thoughtful attitude to his work and subordinates Kovtun greatly contributes to establishing comradely relations among the officers.

He unceasingly improves his own professional knowledge and skills, strictly adhering to the rule: If you've planned a job, do it and recommends his subordinates to observe it too. As a result, the crew members have regular training which enables them to cope with their missions without a hitch.

In order to implement the commander's plan, his subordinates must understand it and act confidently. For instance, when dealing with a tactical mission, the ship's commander must closely cooperate with his executive officer and department commanders and also with those specialists in tactical elements without which they could not fulfil their duties and carry out their personal responsibility for the mission assigned.

There seems to be no problem about achieving team-work and complete mutual understanding in a small collective of specialists as, for instance, in a crew. One might assume that once a collective operates like clock-work, there can be no trouble about it. But it turns out quite different in practice: no sooner has a ship's crew begun to work in concert, than newly drafted personnel arrive. This involves working up training missions once again. Therefore, commanders must concentrate on the regularity and diversity in combat training.

During tactical training Lieutenant-Commander Kovtun does his best to create a situation closely resembling real battle so as to teach his subordinates to operate in complicated conditions against a strong and experienced enemy.

Here is how training is carried out with one of the patrol boat crews. The commander takes care to see that his subordinates analyse the narratives thoughtfully and thoroughly and that all the crew members participate in target identification. The

seamen are trained in a dynamic situation imposing great strain. They usually have to deal with manoeuvring targets and to use diverse methods to counteract the enemy. This makes every trainee use initiative and resolve so as to take a decision independently and to orientate himself in a quickly changing situation. As a result, the skill of the whole crew grows steadily.

However, sailors can really polish up their skill and steel themselves morally only at sea.

When on the high seas the ship's personnel have experiences (such as ship's roll, engine noise, target blips on the radar and sonar screens) which cannot be fully reproduced ashore, in a classroom, no matter how well it may be equipped. The raging of the elements on the open sea should not be disregarded either. It follows that trainees can fully reveal their abilities only during sea cruises.

Once Kovtun's crew was assigned the mission to search for an enemy submarine. Strenuous combat training began as soon as the ship set out to sea. Besides carrying out the search the men had to cope with numerous narratives. To work up their damage-control technique, they had to fight "flooding," to extinguish "a fire," etc. Simultaneously the watch officers were trained in the main control room.

The duty watch officer was given the following narrative: "Mine on ship's course, distance two cables."

The watch officer commanded distinctly: "To port... To starboard... Course 300."

The ship's CO ordered his executive to analyse the watch officer's actions.

According to the executive officer the watch officer failed to consider the direction and strength of the wind. Hence his first two commands should have been reversed.

That is how seamen's daily training is executed on the ship. Each time before setting out to sea the CO draws up a detailed plan and thoroughly analyses the tasks to be assigned to his subordinates. The seamen acquire the necessary combat experience by overcoming difficulties in the course of training. Operating in a situation saturated with narratives they become welded together and their self-confidence increases. Such qualities are indispensable to win a battle.

To prepare his subordinates psychologically for carrying out their mission, the commander must inform them of the situation and also of the forthcoming difficulties. If the ship's crew know how to fulfil their mission, they will act with great enthusiasm and be eager to make their own contribution to success.

When at sea the commander has an opportunity to improve his ability to take a quick, daring and non-stereotyped decision. This may require great courage. During fighting at sea a situation may arise in which it is impossible for the ship's commander to receive exhaustive information from the senior commander, the staff or flagship specialists. He then has to bear full responsibility for solving tactical or technical problems which are usually dealt with at a higher command level. This obliges the commander to develop both in himself and in his subordinates the ability to operate independently, to show initiative, to improve their professional qualifications and to be ready to discharge the duties of their immediate superiors.

Highly active and purposeful Party-political work has a great effect on the commander's skill. Political bodies, Party and Komsomol organisations must help commanders to generalise and spread the best training methods and to elaborate new methodology for improving the quality and effectiveness of the training process.

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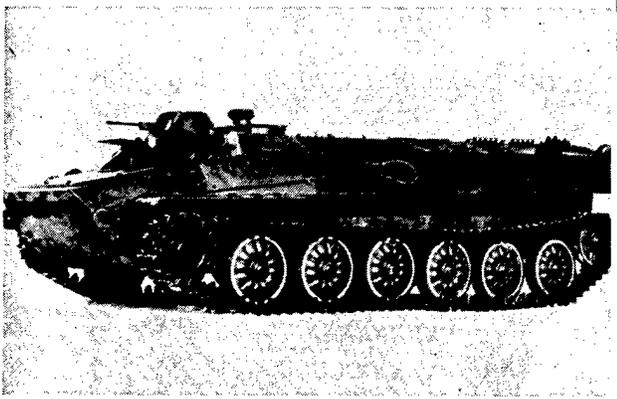
LOGISTICAL SERVICES AND SPECIAL TROOPS

ENG LT GEN I. BALABAY INTERVIEWED ON MILITARY DRIVERS

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 16-18

[Interview of Eng Lt Gen I. Balabay, Deputy Chief of the Central Motor Transport Department of the USSR Ministry of Defense by Capt A. Sholokhov, under the heading "Weapons and Equipment": "Military Drivers"]

[Text]



The MAZ-537 G four-axle (8 drive wheels) special-purpose vehicle possesses high cross-country ability on roadless terrain. Hydromechanical transmission; powerful engine (500 Hp plus) enables it to accelerate up to 50-60 km/h and to tow trailers weighing up to 65 tons.



Caterpillar tractors, carriers and caterpillar carrier-tractors are used as a means of mechanical draught and also for installing weapons and special equipment. Possessing high cross-country ability they accelerate speed up to 60 km/h. Photo: The MT-LB caterpillar carrier-tractor

The GAS-66 two-axle vehicle is intended for transportation of personnel and freight and also for towing trailers up to two tons. Speed — 90-95 km/h. The vehicle easily negotiates marshy and desert terrain or snow-covered country, up-grades up to 30 degrees and fords 0.8 metre deep. A special modification of the vehicle has been designed for the Airborne Forces.

**Comrade General, one can hardly imagine any military unit dispensing with motor transport nowadays. Will you please give a brief account of the history of the Soviet motor transport troops?**

The appearance of the motor transport service (as well as of many other fighting services and arms of the Soviet Army) is inseparably connected

with the name of the great Lenin. On instructions from him, as the Soviet state leader, on January 13, 1918 the People's Commissariat for Military Affairs instituted the Central Motor Transport Section.

In February 1918 the first military motor transport detachment composed of workers and Red Army men was formed at the All-Russia Central Executive Committee. The same year motor transport columns were organised and in 1919, motor transport detachments of divisions and armies. At that time the Soviet Army had a total of 7,500 motor vehicles.

The motor transport troops made a substantial contribution to the Soviet people's victory over their enemies during the Civil War and foreign military intervention (1918-20).

Striving to enhance the defensive power of the Soviet state the Communist Party and Soviet Government concentrated attention on supplying the army with motor transport. As a result of the country's socialist industrialisation the Soviet Army was equipped with more than 272,000 motor vehicles by the beginning of the Great Patriotic War (1941-45).

During the mobilisation period and also in the initial period of the war when our forces had to fight defensive battles in extremely difficult conditions, motor vehicles were used to carry troops and to execute the operational transportation of forces lacking organic transport facilities. Thus, on June 24, 1941 the four divisions of the 47th Infantry Corps were moved from the Baranovichi to the Slonim area to engage the infiltrated enemy. In August 1941 1,500 motor vehicles were allotted to move General Rokossovsky's army from the Kiev area to a new defensive line.

Throughout the whole war the motor transport troops did great work delivering supplies to the army. At the beginning of the operation to destroy Paulus's grouping at Stalingrad 2,500 motor vehicles were used to supply the Soviet forces with ammunition, combat equipment and so on. During the Berlin operation transport vehicles carried 1.5 mln tons of freight.

Used as a traction force for field and AA guns, motor vehicles and caterpillar tractors imparted

mobility and manoeuvrability to artillery units and formations.

One can see from the above how great was the responsibility of the motor transport troops. They performed their duty with honour, as I saw more than once when a front-line soldier. I can cite quite a few examples to illustrate their courage, heroism and devotion to their country and people.

Never will the feat of arms accomplished by the motor transport troops operating on the Leningrad Front be forgotten. They laid over the ice-bound Lake Ladoga a road which went down in history as the "Road of Life." Trucks carried ammunition and food to Leningrad moving on the insecure ice along a track every yard of which might conceal patches of water. On their way back they transported the wounded and sick. Neither the enemy fire, nor cold winds could prevent the heroes from performing their duty.

By the end of the war the army had more than 664,000 motor vehicles. The motor transport was used intensively and carried over 100 mln tons of various freight.

For their great services to the country several transportation units were awarded the title of Guards and 15 units and formations won other honorary titles. Thousands of officers and men of this fighting arm were awarded Orders and medals, the most gallant of them being honoured with the title of Hero of the Soviet Union.

**What are the tasks confronting Military drivers and how do they use their motor transport?**

The Soviet Army is entirely mechanised. It is abundantly provided with motor vehicles of different types and wheeled and caterpillar tractors, caterpillar carrier-tractors and trailers (semi-trailers). Soviet industry supplies the army with motor transport designed to meet the demands of modern battle.

Besides general purpose vehicles wide use is made of special vehicles and caterpillar carrier-tractors provided with launchers AD guided missile and rocket launchers, machine guns and artillery pieces including various equipment to control troops and weapons. Motor vehicles are also used to tow artillery, mortars, aircraft and special trailers (semi-trailers) carrying various equipment and apparatus. Provision is also made for special servicing vehicles, including fuelling vehicles, oxygen and oil dispensers, starter units, crane trucks, staff buses, mobile repair shops, ambulances, special vehicles for chemical and engineer troops, etc.

For instance, in the rocket forces such operations as transportation, checking, propellant filling and loading of missiles are effected by means of motor vehicles or their equipment. To launch some missile, the undercarriage may be used as a base.

No aircraft can do without the service of the motor transport troops. Special motor vehicles are indispensable to check the aircraft electric and hydraulic systems and to provide aircraft systems



The LuAZ-967 vehicle is intended for evacuating wounded on the forward edge and hauling small cargoes. The vehicle negotiates water barriers afloat. The UAZ-469 vehicle transports 0.6 ton of freight and two men. Can tow a trailer weighing 0.85 ton. Possesses good trafficability. Used for troop control and reconnaissance. Radio sets and special equipment are installed on it

with the appropriate fuel, oil, oxygen and air or to load aircraft with ammunition.

In modern warfare motor vehicles play a key role in ensuring mobility and manoeuvrability of land forces, its condition mainly predetermining the forces' ability to cope with their missions.

One cannot fail to mention the great assistance which military drivers render to the country's national economy. They distinguish themselves in harvesting on the virgin lands of Kazakhstan and in building the Baikal-Amur railway line.

**Comrade General, would you tell our readers about the distinctive features of the motor vehicles used in the army. What are their main characteristics?**

Good cross-country ability is the main characteristic of army motor vehicles and tractors. This is obtained through the use of all-wheel drive,

high road clearance and high-power engines. Modern vehicles are provided with a tyre pressure system of unique design. The lower the specific wheel pressure, the higher the vehicle's cross-country ability. Caterpillar vehicles easily negotiate marshy and desert terrain or snow-covered country because their carrying surface is large and hence their specific pressure on the ground is low. The same effect can also be achieved with wheeled vehicles: as the tyre pressure is reduced, the wheels flatten, thus considerably increasing their carrying surface. This tyre pressure system proves highly effective in multi-axle trucks. If necessary, the vehicle driver can change tyre pressure while moving, without leaving the cab.

Quite a few army vehicles are equipped with a self-blocking differential to exclude the possibility of single wheel slipping.

Large cruising range of these motor vehicles makes it possible to carry out prolonged marches without refuelling.

All this allows the use of motor transport in bad road conditions, at any time of the day and any season of the year, irrespective of climatic zones.

**Being constantly improved motor transport has begun to play an increasingly important role in all spheres of army life. This makes it necessary for military drivers to polish up their professional skill. What can you say about military drivers' training?**

It is not easy to train a military driver. This difficult task is carried out successfully by the driving schools at DOSAAF (Voluntary Society for Assisting the Army, Air Force and Navy) where the elements of this profession are studied.

When on active service young drivers and driver-mechanics continue training to improve their qualifications, especially if they are appointed to operate a new type of vehicle or to drive fire engines, ambulances or passenger vehicles. In the army regular professional training is obligatory for the operators of all transportation facilities. In addition to practical driving military vehicle operators improve their combat training standard and raise the level of their political education. They also take part in field exercises.

In military technical schools and special training units the servicemen master new specialities and improve their technique in servicing motor vehicles. Drivers usually study one more civilian trade (motor mechanic or driving instructor).

The officers of the motor transport troops are trained in military higher driving schools in Ryzan, Chelyabinsk and Ussuriysk.

The military driver's job is a hard one requiring the utmost physical and moral effort. To cope with his tasks in modern warfare, the driver must be a good specialist with firm ideological convictions and physically perfectly fit.

MOTOR TRANSPORT TROOPS ARE SPECIAL FORCES CONSISTING OF TRUCK UNITS ASSIGNED TO FORMATIONS AND THE LOGISTICAL SYSTEM OF THE SOVIET ARMED FORCES. THEY ARE USED TO DELIVER SUPPLIES TO THE FORCES TO PROVIDE FOR THEIR DAILY NEEDS AND COMBAT ACTIVITY, TO EVACUATE THE WOUNDED AND SICK, TO RECOVER WEAPONS AND COMBAT EQUIPMENT AND ALSO TO CARRY OUT TROOPS TRANSPORTATION.

AT THE REQUEST OF THE EDITORS OF OUR MAGAZINE CAPTAIN A. SHOLOKHOV ASKED LIEUTENANT-GENERAL ENGINEER I. BALABAI, DEPUTY CHIEF OF THE CENTRAL MOTOR TRANSPORT DEPARTMENT OF THE USSR DEFENCE MINISTRY TO GIVE AN INTERVIEW.

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## LOGISTICAL SERVICES AND SPECIAL TROOPS

### ENGINEER SUPPORT OF COMBAT OPERATIONS

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 26-27

[Article by Col V. Kholyavko: "A Movement Support Detachment"]

[Text]

Modern battle is characterised by high dynamism and quickly changing situations. In such circumstances subunits have frequently to manoeuvre and carry out marches. This increases the importance of march training and engineer support activities on the march route.

When fulfilling missions forces have to cope with various difficulties. The speed of their advance depends largely on road conditions, terrain trafficability and the season of the year. Besides, they must be ready to surmount the various obstacles left by the withdrawing enemy (such as demolished bridges, slashings, mine fields, etc.). This makes it necessary to detail a movement support detachment (MSD) for each march route to repair roads and thus to ensure the unhindered advance of the marching columns.

The core of the MSD is highly mobile and specially equipped road (combat engineer) subunits which can quickly construct a bypass to avoid demolitions (obstructions), make a passage through an obstacle or a lane through a road block or mines including those laid by the remote method.

During an offensive an MSD may encounter scattered enemy groups. This makes it necessary to assign motorised infantry and tank subunits to the detachment to help it fulfill its mission. These subunits may also be charged with the task to operate jointly with the combat engineer subunits in constructing a bypass to avoid obstacles and so on.

The composition and equipment of the MSD depends on the mission assigned, the road and terrain conditions and also on the intensity of enemy activity and the season of the year.

The MSD is provided with the following equipment: one or two vehicular induction mine detectors, a tank mine sweeper, a dozer tank, one or two bridge-laying tanks, when necessary track-layers, a heavy mechanical bridge set, one or two crane trucks, prefabricated bridge sections, mine clearing charges, explosives and communication facilities.

The MSD must not be overloaded so as to maintain its manoeuvrability and compactness, all its vehicles being provided with the required motor potential.

To cope with the assigned mission, the MSD commander must properly assess the engineer reconnaissance data on the march route. He must see to it that on each section of the route the engineer activities end before the marching column reaches the place and that the specified forestalling in time is observed.

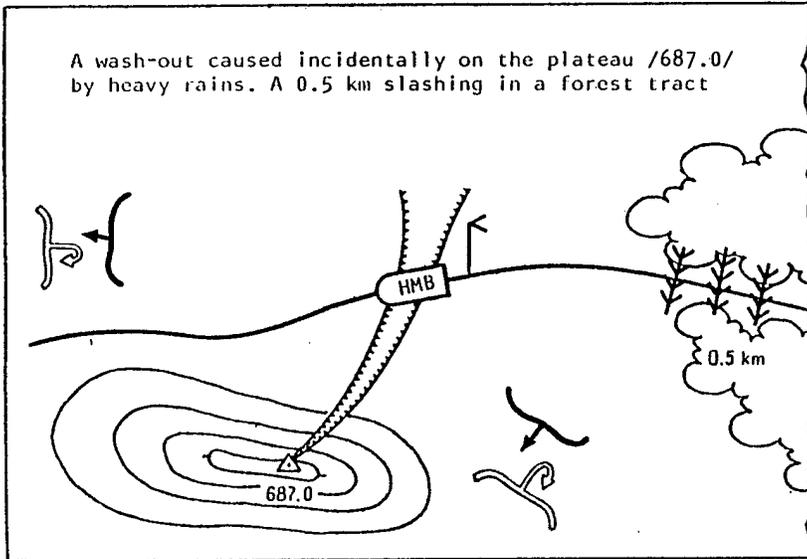
Provision is made for the requisite engineer teams (see Sketches) to overcome such obstacles as slashings, road blocks in mountainous country, mine fields, non-mined obstacles, craters in the roadway or a demolished bridge across a water barrier or a ravine.

The engineer teams are equipped depending on the kind of work to be done and the route sections. These teams carry out engineer reconnaissance, remove obstacles, demine where necessary, rebuild roads and road works, construct bridges, etc (see Sketches).

In some cases helicopters are used to carry out the engineer reconnaissance of the march route and to deliver the personnel and construction material to the site.

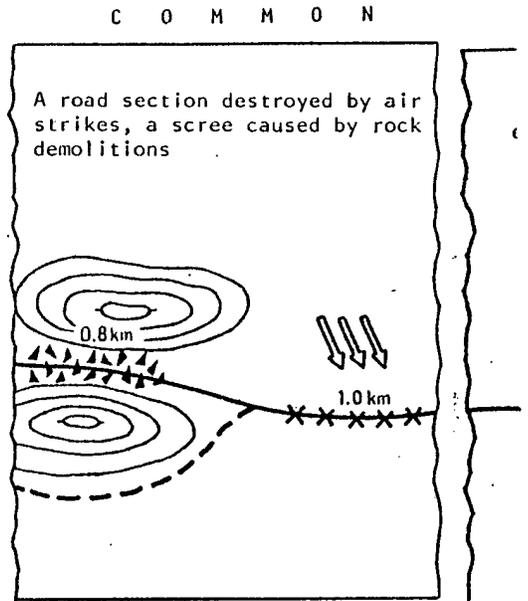
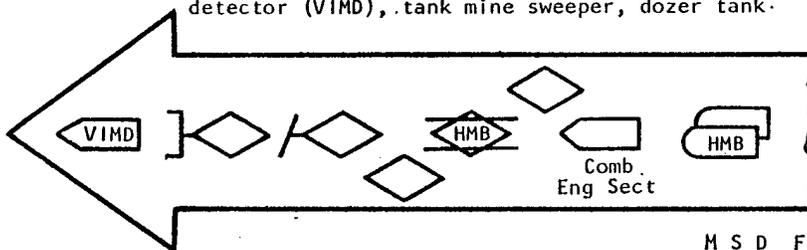
The MSD fulfils its mission either successively passing from one objective to another or by the "leap-frog" method. The latter method is more effective when teams not engaged in removing one

obstacle move forward to the next and cover as large front of work as possible. It is of paramount importance that the composition and equipment of each engineer team correspond to the work to



ENGINEER RECONNAISSANCE TEAM:

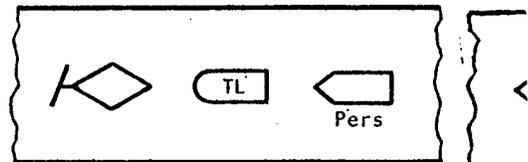
combat engineer section, heavy mechanical bridge (HMB) half-section, vehicular induction mine detector (VIMD), tank mine sweeper, dozer tank.



OBSTACLE DEMOLITION TEAM:

road section, dozer tank, track-layer (TL), explosives

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vehi  
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mine

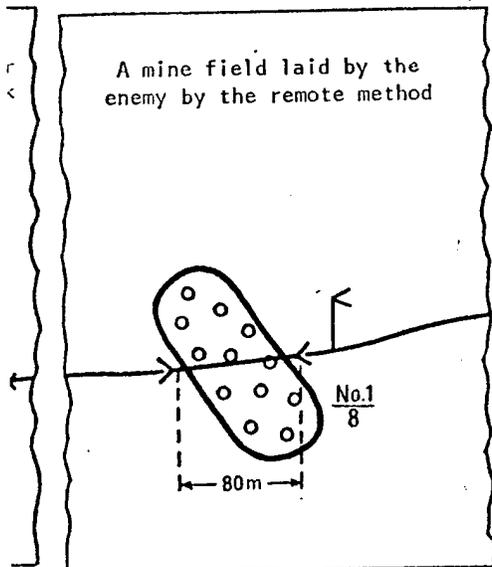


MSD FORMATION ASSUMED WHEN FU

be done so as to enable it to fulfil its mission in good time and without hindering the advance of the marching column.

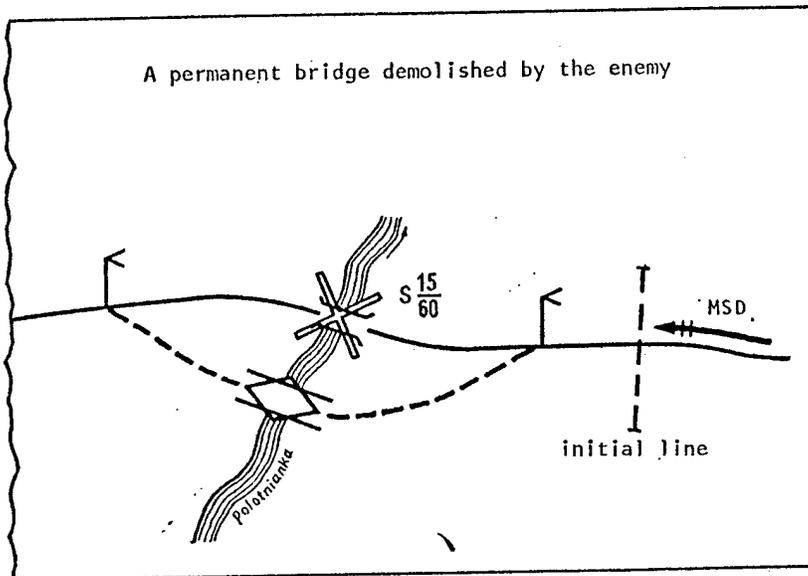
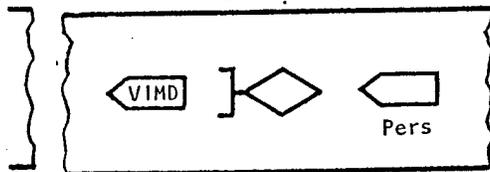
The MSD commander usually occupies the place where the most difficult work is carried out. From there he controls his subordinates and organises cooperation in space and time.

O B S T A C L E S



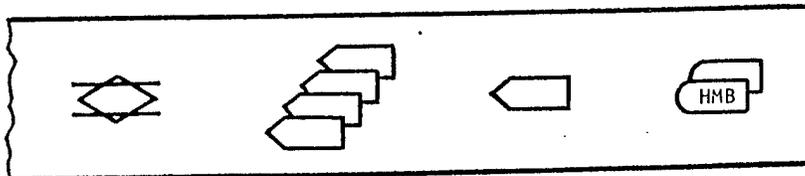
MINE CLEARING TEAM:

combat engineer platoon, vehicular induction mine detector, tank mine sweeper, mine clearing charges, explosives



ROAD AND BRIDGE CONSTRUCTION TEAM:

bridge construction platoon, bridge-laying tank, set of prefabricated bridge sections, crane truck, heavy mechanical bridge half-section



N F U L F I L L I N G C O M B A T M I S S I O N

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## LOGISTICAL SERVICES AND SPECIAL TROOPS

### TECHNICAL SUPPORT OF AN ADVANCED DETACHMENT DISCUSSED

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 42-43

[Article by Eng Col R. Dmitriyev: "Technical Support of an Advanced Detachment"]

[Text]

**Successful solution of tasks set to an advanced detachment largely depends on the technical support, whose organisation is exemplified in the given article by a reinforced motorised infantry battalion.**

The repair and evacuation facilities at the disposal of the battalion may prove insufficient for reliable technical support of an advanced detachment. Therefore, it receives two tank recovery vehicles, a TPM-A mobile tank repair workshop run by repair subunit specialists, and the required stock of armour and automobile equipment. Proceeding from the mission assigned and the technical support instructions of the battalion CO and the senior commander, the deputy battalion CO for technical service organises preparation of the equipment, support facilities and the personnel to act as an advanced detachment.

The reliability of armament and equipment and their quick rehabilitation are of particular importance in ensuring the subunits' combat efficiency. Therefore, a whole range of measures within Maintenance No. 1 and No. 2 are envisaged, the kind of maintenance in each particular case depending on the distance covered since the preceding maintenance of the vehicles, their condition and the time required to get ready for action.

The reliability of vehicles is largely predetermined by the proficiency of officers, crews and tank and automobile drivers. Therefore the battalion command make a point of allotting time for special training of servicemen, including the personnel of repair and evacuation and of rescue and evacuation teams.

The deputy battalion CO details a maintenance vehicle to render assistance to crews and drivers during the training period. To eliminate the faults detected, he may enlist the services of repair specialists.

The preparation of equipment for action in each company is directed by deputy company commanders for technical service, who inspect all the vehicles and place an order with the deputy battalion CO (the latter with the senior commander) for the requisite number of maintenance and repair facilities.

Disabled vehicles requiring a large volume of repair work are rehabilitated by facilities organic to the repair subunit.

For reliable organisation of technical support of the advanced detachment tank recovery vehicles are provided with handling equipment, wire ropes, repair accessories, tools and spare parts.

It is also advisable to supply the recovery vehicles with 15-20 track shoes, an equal number of track pins, driving sprockets and idler wheels, 2-3 road wheels and standardised devices for mounting and dismounting the components of the running gear. Mobile repair workshops have rubberised hoses for the coolant, fuel and lubrication systems.

Wheel vehicles should be provided with spare parts and instruments for the electrical equipment, ignition, fuel supply and brake systems, brake fluid and the like.

In case of lack of time the deputy battalion CO must display special efficiency after he has received the combat mission.

Having familiarised himself with the mission and

the senior commander's instructions on technical support, he plots on his working map the route and the line to be captured and held until the arrival of the main force, the location of repair facilities and evacuation route. After that he specifies the mission and does the timing.

It may happen that not all technical support operations have been completed by the time the battalion has received the mission. In this case the deputy battalion CO issues warning orders with specific instructions on the procedure and time of completion of the work to prepare the personnel and equipment for action.

In order not to distract deputy company commanders from their work, it is advisable that each of them receives instructions more concrete. These instructions are brought to the knowledge of company (including attached companies) commanders and the commander of the battalion maintenance and repair subunit.

Then the deputy battalion CO assesses the situation.

Though the deputy CO is aware of the personnel's technical training level and the general condition of the battalion equipment, in assessing the situation he will need additional data on the attached subunits, the personnel's knowledge of the conditions of vehicle operation in the zone of the advanced detachment's actions, the number of tanks, IFVs and other combat equipment in each subunit, their technical condition and cruising range.

When assessing the situation the deputy battalion CO discusses with the chief of staff the organisation of communication for the technical support, the place of the technical trail within the advanced detachment's column when advancing to the commitment line, location of the repair and evacuation group (REG) and of the technical observation point (TOP) and other questions.

The deputy reports to the battalion commander suggestions and then his decision on organisation of the advanced detachment's technical support. After his decision has been approved he may call deputy company commanders, commanders of supply platoons and of the battalion maintenance and repair subunits, and give them verbal instructions.

These instructions generally include: kind of maintenance for the weapons and equipment at the end of the day on which the battle takes place and the procedure for carrying it out; composition, order of movement and missions for the technical trail during the advance of the detachment; composition, missions and location of the REG on the commitment line, instructions for movement and rehabilitation of vehicles during battle, way of handing over disabled vehicles which cannot be repaired by the battalion REG to the senior commander's facilities; disabled vehicles collection point (DVCP) and the route for bringing ve-

hicles to it; communication procedure between the TOP and the REG.

Having given the instructions, the deputy battalion CO checks on their execution by the subunits, and reports on the work done to the battalion CO at the predetermined time.

The deputy battalion commander is generally chief of the advanced detachment's TOP; he works jointly with deputy commanders of companies and attached subunits.

The technical trail includes a tank recovery vehicle, a maintenance vehicle, a vehicle carrying spare parts, fuel and lubricants, and an ambulance vehicle. The battalion maintenance squad leader is appointed chief of the technical trail. The remaining equipment—a second recovery vehicle, the mobile tank repair workshop and the vehicle with spare parts, fuel and lubricants—is with the REG. The functions of REG chief are performed by the repair squad leader. When the advanced detachment advances to the commitment line the REG is not used to repair vehicles en route; it begins to work only at the beginning of the battle.

After the advanced detachment has deployed for action the technical trail facilities start to discharge the functions of a second REG.

During fighting on an exposed flank the REG men with the necessary tools are on the tank recovery vehicles in the vicinity of the subunits engaged. The remaining REG equipment is under cover close to the flank and is moved on the TOP chief's instructions.

The advanced detachment's manoeuvres may necessitate movement of the REG at any moment. Therefore, it is most important to get ready for evacuation of vehicles from sectors where the enemy is likely to score success or perform a manoeuvre in order to break through to the flank and the rear of the advanced detachment.

After the advanced detachment has fulfilled its mission technical support is organised according to the situation.

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## DOSAAF AND MILITARY COMMISSARIATS

LT GEN V. V. MOSYAYKIN, DEP CHAIRMAN, DOSAAF CC ON DOSAAF PROGRAMS

Moscow SOVIET MILITARY REVIEW in English No 10, Oct 82 pp 62-64

[Article by Lt Gen V. V. Mosyaykin, Deputy Chairman, USSR DOSAAF CC: "Vital Concern of the People"]

[Text]

**The Voluntary Society for Assisting the Army, Air Force and Navy (DOSAAF of the USSR) plays a big role in building up the country's defence capacity and training citizens, youth in particular, for the defence of the Homeland.**

**This year the DOSAAF of the USSR is marking its fifty fifth anniversary. Lieutenant-General V. V. Mosyaikin, Deputy Chairman of the DOSAAF Central Committee, gives an account of the Society's activities.**

The Voluntary Society for Assisting the Army, Air Force and Navy (DOSAAF) has a splendid record. Founded 55 years ago on the initiative of the Soviet working people it has done much to promote and put into practice V. I. Lenin's ideas about the defence of the Socialist Homeland, to instruct the civilian population in the rudiments of warfare and military equipment. This effort has helped raise the combat readiness level of the Soviet Armed Forces. The DOSAAF organisations have given millions of boys schooling in patriotism, have steeled them and equipped them with knowledge essential for the armed defence of the Socialist Homeland.

The DOSAAF of the USSR is a public organisation which functions on principles of democratic centralism. Its highest body is the All-Union Congress which is convened at least once every five years. In the periods between congresses the Society is administered by its Central Committee. The local organisations at factories, plants, on collective and state farms, at institutions and educa-

tional establishments form the basis of this Society. Any citizen of the USSR who has reached the age of 14 may apply for membership.

In most towns and cities the DOSAAF organisations have good training and sports facilities. Its schools, clubs and Defence Houses are equipped with modern trainers, apparatus, and instruments. The Society builds motor vehicle and motorcycle training grounds, racing tracks and other structures. It acquires sports vehicles, equipment and apparatus.

The main purpose of the DOSAAF is to prepare the youth for service in the Armed Forces of the USSR. Service in the army and navy imposes a great strain, it calls for courage, endurance, firmness of character and discipline. Therefore, to prepare the boys for service many of them receive before actual call-up the necessary elementary training at motoring, technical, seamanship, radio engineering and combined technical schools, flying clubs and other organisations of the Society.

The boys master combat equipment and weapons, acquire knowledge and skills essential for the soldier or seaman to gain the necessary degree of proficiency as a member of a crew. The instructors and Young Communist League activists educate them in the spirit of patriotism and keep them in good physical condition.

A distinguishing feature of the Society is that it also trains technicians and tradesmen for the national economy, such as tractor, harvester combine and motor vehicle drivers, aviation, marine and radio specialists and also other skilled trades. Every year more than two million young men

learn trades in DOSAAF organisations. Before they are called up for military service they work in industry or agriculture.

The DOSAAF pays serious attention to educating the young people in the spirit of the revolutionary, combat and labour traditions developed

by the Communist Party and the Soviet people. Older members of the Party, veterans of the Great Patriotic War and in general people with considerable experience in life make a sizable contribution to this effort. They help carry out mass defence weeks and months, hold meetings with representatives of different age groups, conduct lessons in courage and other patriotic measures.

Commanders and political organs of the army and navy, Party and YCL organisations of military units constantly assist the local DOSAAF organisations in the military and patriotic education of youth, in promoting military and military-technical knowledge.

Many officers, praporshchiks, mitchmans, sergeants, soldiers and sailors who have excellent achievements to their credit in combat training and political education regularly visit work collectives at factories, plants, collective farms and state farms, boys and girls at schools, deliver reports and conduct talks. They also help with lessons at various circles.

A special role in military and patriotic education of young people is played by the All-Union Youth March to Sites of Revolutionary, Combat and Labour Glory (Chairman of the Central Headquarters is Marshal of the Soviet Union I. Kh. Bagramyan, Twice Hero of the Soviet Union), the All-Union Military Sports Games "Zarnitsa" and "Orlyonok." The respective honorary commanders of these games are General of the Army I. I. Guskovsky, Twice Hero of the Soviet Union and Pilot-Cosmonaut of the USSR, Twice Hero of the Soviet Union, Lieutenant-General of the Air Force G. T. Beregovoi.

The young people are assisted in the conduct of these games by commanders, Communists and YCL members of military units and formations, representatives of military registration and enlistment offices, Soviet War Veterans' Committee, state and public organisations.

In compliance with a Decision of the CPSU Central Committee and USSR Council of Ministers "On Further Advancement of Mass Physical Training and Sport" the DOSAAF made a special effort to draw young people into technical and applied military sports. These sports help master modern equipment, raise labour productivity, improve professional skills, kindle an interest in inventions and innovations. The best innovations

produced by members of the DOSAAF are displayed at the Exhibition of Economic Achievements of the USSR. Radio enthusiasts of the Society have taken part in developing a number of systems for artificial Earth satellites of the Radio series.

Local DOSAAF organisations frequently organise expositions of sports apparatus and equipment. In 1981 one such exposition was held at

Kuibyshev, where 30 regions and Autonomous Republics of the Russian Federation demonstrated over 200 works. Many of these have been put into production and have yielded a considerable economic effect.

The DOSAAF pays serious attention to organising physical culture for people at their places of residence. The Society has enlisted the services of experienced personnel and educators to conduct this work with children and adolescents. They train boys and girls for competitions in sports for the GTO (Ready for Labour and Defence) badge.

This year saw the completion of Spartakiades, All-Union correspondence competitions of schoolchildren and students of vocational schools held all over the country. The winners of the 3rd All-Union Sports Games of young people in ten technical and applied military sports, Hero Cities' matches in cross-country motorcycle races, motor boat races, combined sea sports competitions and ship modelling were made known. The boys who attended child-youth technical sports schools took part in carting, sea yawl, motorcycle and scooter races. The judges have named the winners who made the best models of aircraft, ships, rockets and cars. The competitions developed into exciting sports festivals.

Training of young people at patriotic clubs, such as the Young Marksman, Young Frontier Guard, Young Aquanaut, Young Radio Enthusiast, provides a basis for developing high class athletes for the USSR's national team. Thus, the coaches and trainers of a specialised diving school trained more than 300 masters of sports and first grade athletes. The trainees took part in many All-Union and international competitions and set 14 world records in underwater swimming races.

DOSAAF athletes train to secure new victories and records. They engage in 18 technical sports. Every year they take part in 150 international tournaments and championships. At these events they have excelled 330 top world achievements.

This year DOSAAF athletes V. Lyufich, S. Kazakov and V. Sukhov repeated their achievements in ice track motorcycle races and still hold their

lead in the world. Masters of underwater swimming races have set new world records, so today all the world's top achievements in this sport belong to Soviet athletes. Soviet motor ball players won the European cup for the eleventh time. N. Ushmayev became absolute world champion in parachute jumping. Athletes in aviation sports set 120 records, including 90 world records. DOSAAF athletes have shown good performances in other technical sports too.

Thousands of boys and girls taking part in mass competitions improve their skill in driving cars and motorcycles, flying planes, sailing, parachute jumping, swimming and shooting.

The DOSAAF is extending and strengthening its ties with the defence and sports organisations and societies of the fraternal socialist countries. It exchanges delegations, participates in the work of congresses, bilateral conferences, conducts joint sports competitions under the motto "Friendship and Fraternity." These exchanges enrich the organisations with advanced experience in defence and sports work and promote the internationalist education of young people.

The Soviet people are engaged in peaceful construction. But they never forget that there are forces in the world still eager to crush the world's first socialist state. That is why building up the defence capacity of the USSR is the concern of the whole of the Soviet people. The attention and efforts of the DOSAAF and its multimillion membership are concentrated on this goal.

#### Figures and Facts

\* At present there are close on 350,000 local DOSAAF organisations with a membership of nearly 100 million.

\* In the Eleventh Five-Year-Plan period (1981-85) it is intended to train or retrain 11.5 million specialists, including seven million motor vehicle and other transport drivers, and 150,000 machine operators for collective farms and state farms.

\* In the USSR there are 2,250 people's universities (adult education centres) and 3,000 faculties of military knowledge to prepare boys for military service. One hundred and sixty seven thousand local DOSAAF organisations have circles attended by 21 million boys every year.

\* DOSAAF athletes prepare their own sophisticated apparatus and equipment for the competitions. In 1981 the DOSAAF radio enthusiasts put on display at the USSR Exhibition of Economic Achievement 700 exhibits, 204 of which were awarded medals by the Exhibition.

\* Every year DOSAAF local organisations conduct a million and a half competitions with 50 million boys and girls participating.

\* Five hundred and sixty thousand athletes train at 3,200 DOSAAF technical sports clubs and 35,000 schoolboys and schoolgirls attend its 102 specialised sports schools. Two hundred and ninety two marksmanship clubs are active.

\* In 1976-80 alone the DOSAAF trained 7,054 Masters of Sports of the USSR and 18,800,000 athletes with official sports gradings. Millions of boys and girls have fulfilled the standards for the GTO (Ready for Labour and Defence) complex in marksmanship.

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